



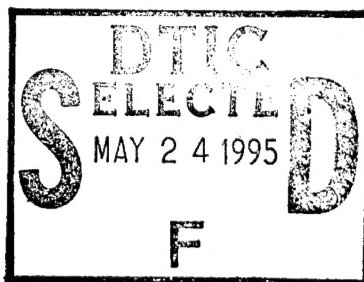
**US Army Corps
of Engineers**

Waterways Experiment
Station

Technical Report HL-95-1
March 1995

Delaware Bay Field Data Report

by Tim Fagerburg



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by Tim Fagerburg

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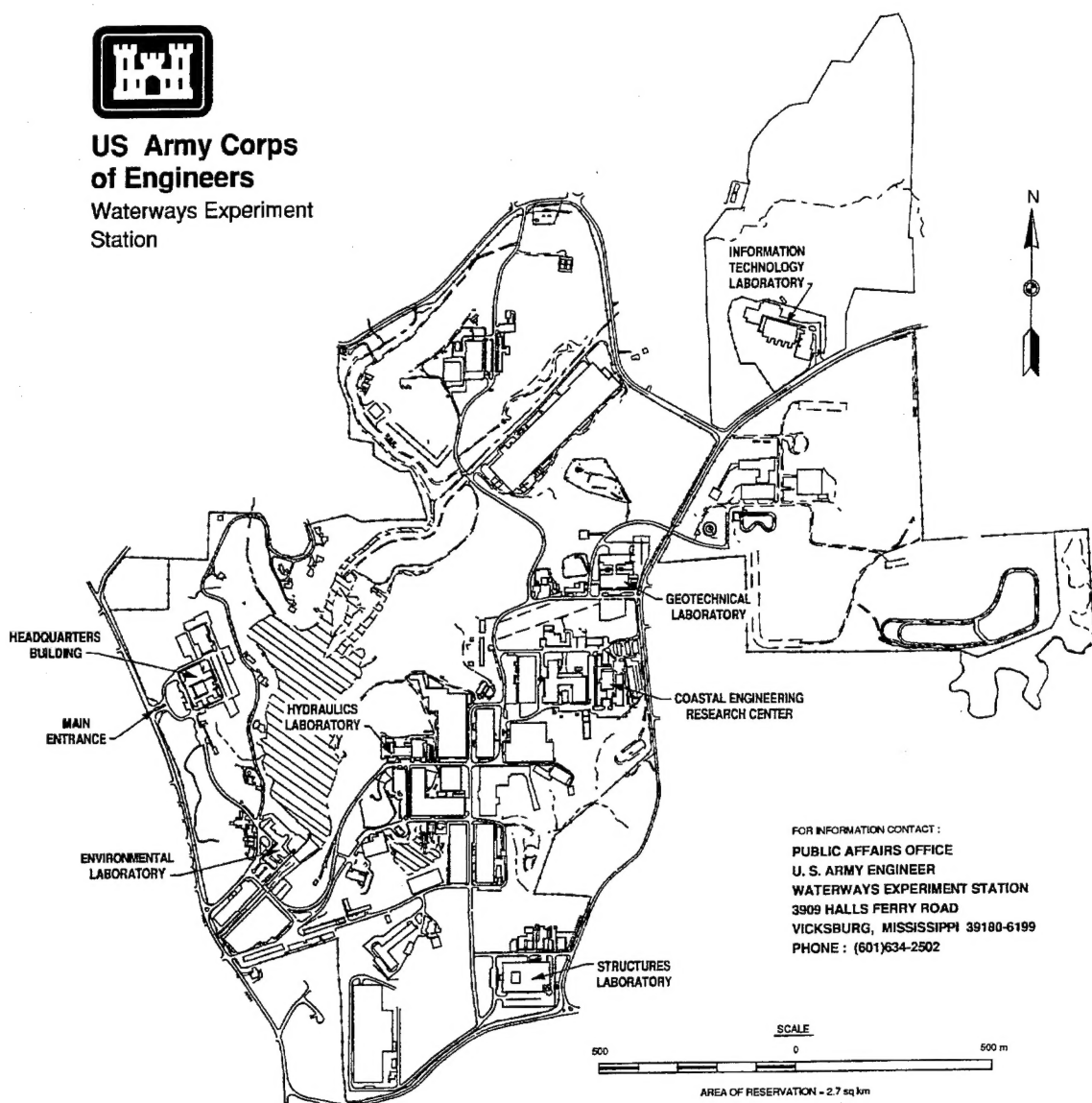
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Preface

The field investigation reported herein was conducted by the U.S. Army Engineer Waterways Experiment Station (WES), Hydraulics Laboratory (HL), from 6 October 1992 through 13 October 1993, to provide the necessary data for support of the U.S. Army Engineer District, Philadelphia, proposed channel modification project. This effort was funded by the Philadelphia District under the management of Mr. J. Gebert. The WES liaison was Mr. D. R. Richards, Estuarine Simulation Branch, Estuaries Division (ED).

Personnel of the HL, Estuarine Processes Branch (EPB), performed the work under the general supervision of Messrs. F. A. Herrmann, Jr., Director, HL; R. A. Sager, Assistant Director, HL; W. H. McAnally, Jr., ED; and G. M. Fisackerly, EPB. The data collection program was designed by Messrs. G. M. Fisackerly, T. L. Fagerburg, H. A. Benson, and J. W. Parman, EPB. Data reduction was performed by Mrs. C. J. Coleman and Mr. Fagerburg, EPB. Laboratory analyses of water samples were performed by Mrs. Coleman and Mr. Parman. This report was prepared by Mr. Fagerburg.

At the time of publication of this report, Director of WES was Dr. Robert W. Whalin. Commander was COL Bruce K. Howard, EN.

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Conversion Factors, Non-SI to SI Units of Measurement

Non-SI units of measurements used in this report can be converted to SI units as follows:

| Multiply | By | To Obtain |
|----------------------|------------|-------------------|
| cubic yards | 0.7645599 | cubic meters |
| degrees (angle) | 0.01745329 | radians |
| feet | 0.3048 | meters |
| inches | 25.4 | millimeters |
| miles (U.S. statute) | 1.609347 | kilometers |
| ounces (U.S. fluid) | 29.57353 | cubic centimeters |

1 Introduction

Background

Delaware Bay, a large estuary on the Atlantic coast, located between Delaware and New Jersey, is a biologically productive and economically important estuary (Figure 1). It is a very valuable resource for local, commercial, and recreational fishing industries.

The study of circulation and salinities in the Delaware Bay system is a complex issue. A number of physical processes operate in the Bay and their relative importance can vary both spatially and temporarily. Bathymetry and geometry of the Bay, astronomically tide-induced currents, wind-induced circulation, density variations and resulting gravitationally induced currents, and freshwater inflow are major factors determining bay-wide circulation and salinity patterns. In addition, proposed deepening and widening of the Delaware Estuary navigation channel could affect both circulation and salinities throughout the bay system.

The Chesapeake and Delaware (C&D) Canal is the only navigation channel between the Delaware Bay and the Chesapeake Bay. The C&D Canal connects the two bays from the Delaware River to the Elk River. The authorized channel is 138 m wide and 11 m deep at mean low water (mlw). The Delaware navigation channel extends from the entrance at the Atlantic Ocean to the upper reaches of the Delaware River, above Trenton, NJ. Typical tide ranges for the Delaware Bay system are 1.2 m at Lewes, DE, 1.8 m at Philadelphia, PA, and 2.4 m at Trenton, NJ, head of tide. The navigation channel from the sea for a distance of 56 km through the Delaware Bay is 305 m wide with a project depth of 12 m at mean low water (mlw). The channel depth remains the same from this point up to the project limit, Allegheny Avenue, Philadelphia. However, the channel width varies between 122 to 244 m.

Channel improvements for the Delaware Bay channel are proposed to deepen the channel to a depth of 14 m, mlw. The channel improvements will extend from the entrance at the Atlantic Ocean to Philadelphia, PA.

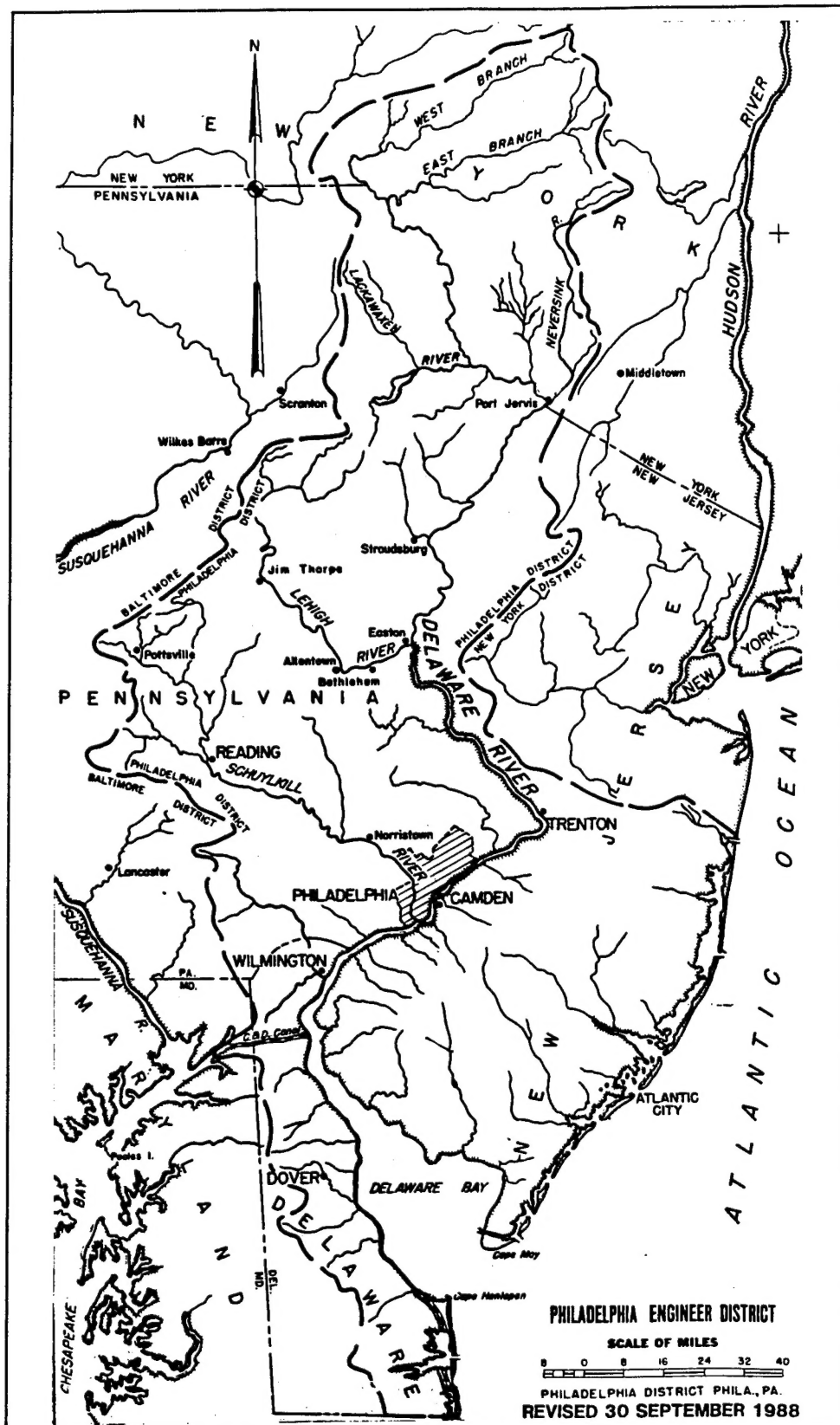


Figure 1. Project vicinity map

Purpose

The purpose of the Delaware Bay monitoring program was to provide the necessary boundary condition, initial condition, and verification data for a comprehensive numerical model study and ship simulation study of Delaware Bay. The purpose of this report is to provide a permanent record of the instrumentation and techniques employed during the field investigation and to make the data available for use.

Scope

This report presents representative results of the field investigation of the Delaware Bay system during October 1992 through October 1993. Measurements consisted of the following:

a. Short term:

- (1) Current speed and direction at eight ranges.
- (2) Salinity samples at each of the ranges.

b. Long term:

- (1) Water-level monitoring at three locations.
- (2) Salinity measurements at one of the water level monitoring locations.
- (3) Salinity measurements at 10 locations.
- (4) Fixed-depth current speed, direction, and salinity at four locations.

This report describes the field investigation equipment and methods used to collect the data, shows representative results of the data reduction efforts, and summarizes the results of these efforts.

2 Data Collection Equipment and Program

Data were collected in Delaware Bay on 11 through 25 October 1992 and on 19 through 30 April 1993 as part of the short-term data collection program and were concurrent with the long-term data collection program that began on 6 October 1992 and extended to 13 October 1993. During the data collection periods, water level recorders, moored current meters, and salinity recorders were in place continuously. As part of the short-term programs, over-the-side profile measurements of current speed, direction, and salinity concentrations were obtained. In addition, the collection of water samples was performed for quality control of salinity concentrations. The short- and long-term data collection efforts are described in further detail in subsequent sections of this report.

Equipment and Deployment Locations

Water-level measurements

During the Delaware Bay field investigation, instruments were deployed for monitoring of water levels. These instruments are identified on the location map, Figure 2, as locations S0.8, S3.9, and S6.4. Descriptions of locations in relationship to channel orientation, landmarks, and latitude/longitude are listed in Table 1. Water-surface elevations were monitored using Environmental Devices Corporation (ENDECO) model 1029 and 1152 SSM electronic water-level recorders, as described in Appendix A. Near-surface salinity concentrations were also recorded by an ENDECO 1152 SSM recorder deployed at location S0.8. The remaining locations recorded water levels only.

Fixed-depth current speed, direction, and salinity

Fixed-depth current speed, direction, and salinity measurements were recorded using ENDECO model 174 SSM current meters similar to that described in the section on recording velocity meters of Appendix A. At each location a single meter was deployed, positioned at a 0.6-m depth as

referenced to the location depth at low tide levels. Three deployment locations along the C&D Canal were monitored during both the intensive survey and long-term field investigation. These locations were designated as stations S3.5, S3.9, and S4.9 and are shown in Figure 2. Descriptions of the instrument locations in relationship to channel orientation, landmarks, and latitude/longitude are listed in Table 1. The sampling interval of these recording current meters was 10 min. After a period of approximately 2 months from the start of the long-term field investigation, one of the current meter deployment locations within the C&D Canal was changed due to problems with navigation traffic. Location S4.9 was relocated from the original deployment site and redeployed at location S4.8 as indicated in Figure 2.

Salinity measurements

The salinity concentrations at eight locations, other than the water-level recorders and fixed-depth current meters, were recorded with the Hydrolab Datasonde 3 water quality data logger, as described in the Salinity Measurements section of Appendix A. These instruments were deployed in areas relatively close to the navigation channel and in water depths ranging from 8.0 to 14.0 m. The instruments were positioned at between 0.8- to 0.9- and 0.2-m depths. At these depths, the meters were suspended vertically on amoor cable, subsurface float, and heavy weight arrangement similar to that shown in Figure A4, Appendix A. Eight deployment locations were originally chosen for both the intensive survey and long-term field investigation. They are designated as stations S1.2, S1.3, S1.8, S3.5, S3.9, S4.9, S6.2, and S6.3, as shown in Figure 2. Descriptions of the instrument locations in relation to channel orientation, landmarks, and latitude/longitude are listed in Table 1. For safety and security of the instruments, several deployment sites were relocated to more protected areas. These locations are identified as S1.4 and S4.8. At approximately the midpoint of the long-term field investigation, an additional deployment of salinity recorders was added in the upper part of the Delaware Bay at location S3.1. The sampling interval for these salinity recorders was 15 min.

Current speed and direction measurements

During the October 1992 intensive survey, five boats deployed recording current meters and portable water sampling instruments over the side to collect current speed, direction, and salinity profiles. The equipment is described in Appendix A. At the following four data collection ranges, identified as R1.0, R2.0, R3.0, R6.0, and R7.0, four boats were used to monitor each range on alternating days. One boat was stationed at range R1.5 during the first day of data collection for baseline data purposes; it then moved to range R6.0 for the remainder of the 2-week period. The data collection ranges, shown in Figure 3, consisted of two to four stations each. Measurements were made at three to five different depths.

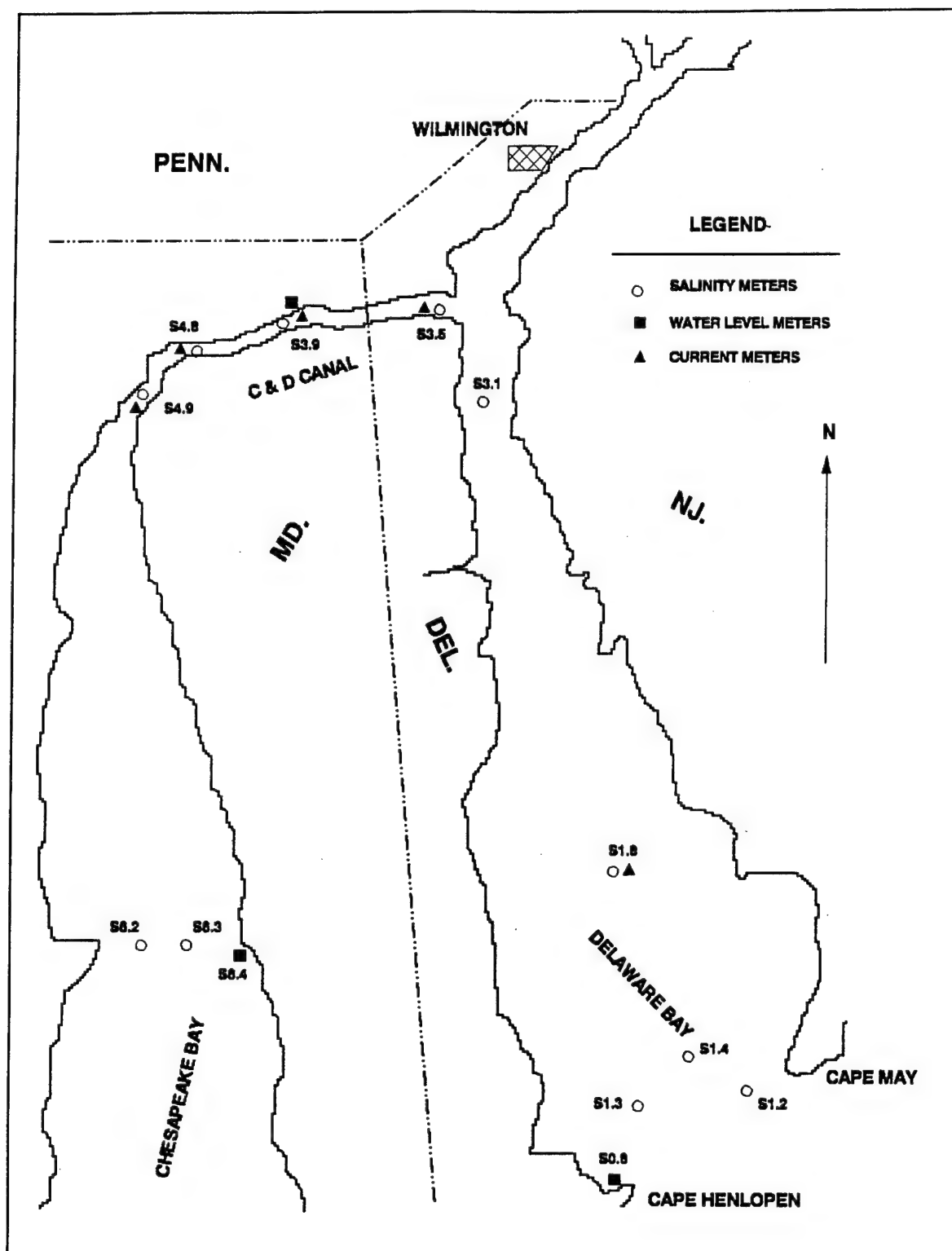


Figure 2. Equipment deployment locations

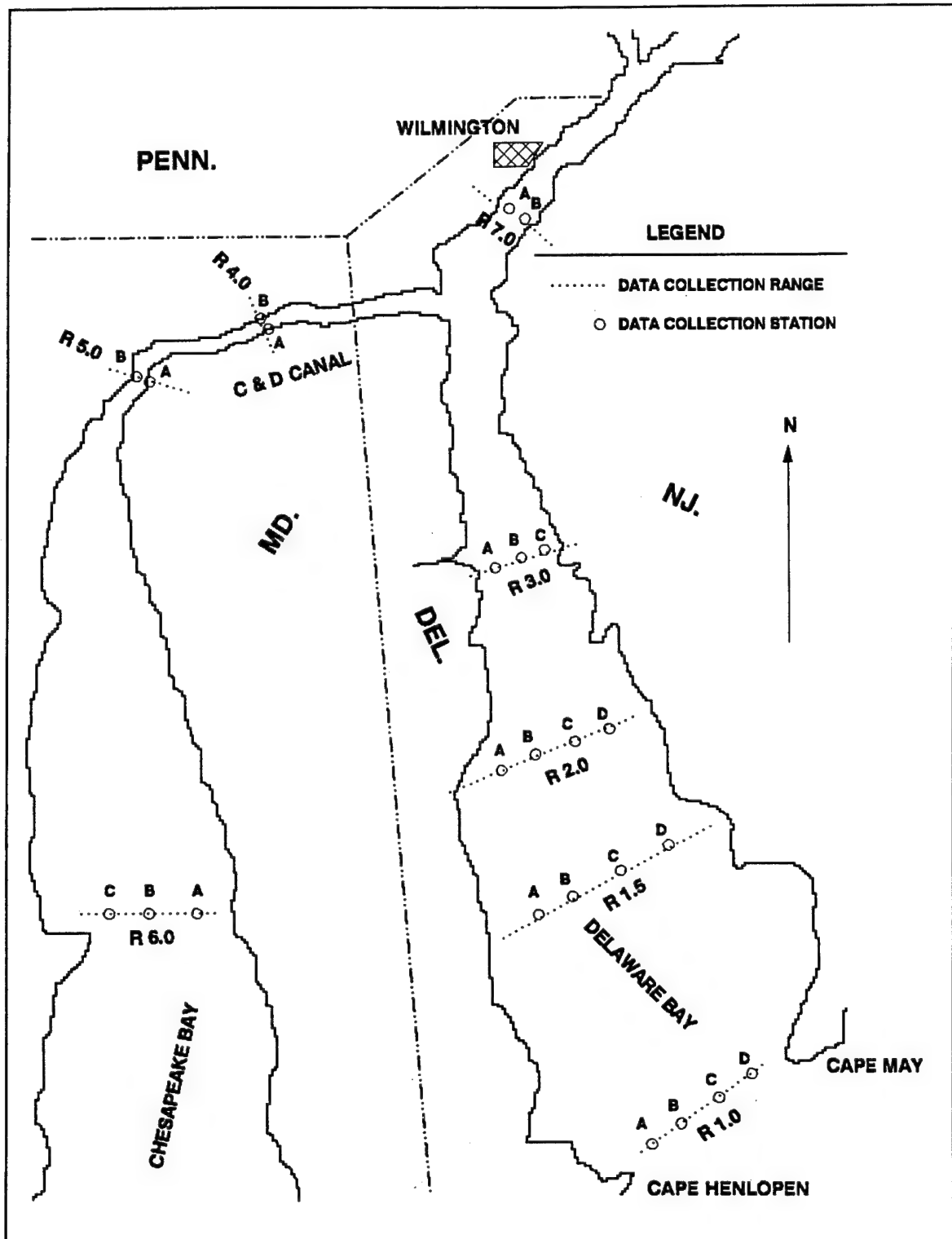


Figure 3. Data collection ranges and stations

During the April 1993 intensive survey, six boats were used to deploy instruments for current speed, direction, and salinity profiles. Five boats were stationed daily at ranges R1.0, R2.0, R3.0, R6.0, and R7.0 during the data collection period. The remaining boat monitored ranges R4.0 and R5.0 on alternating days during the data collection period. Range R1.5 was again monitored only on the first day of data collection. Then the boat was positioned in the C&D Canal (ranges R4.0 and R5.0) for the remainder of the 2-week period. The data collection ranges listed previously had from two to four profiling stations for data collection.

Data collection range locations

For each intensive data collection survey, the data collection ranges were selected to yield the information most applicable to numerical model study. The ranges are identified as R1.0, R1.5, R2.0, R3.0, R4.0, R5.0, R6.0, and R7.0. The general location of these ranges are shown in Figure 3. Descriptions of the data collection range locations in relationship to channel orientation, landmarks, and latitude/longitude are listed in Table 2.

Boat procedures

Prior to the beginning of the survey, the boats assigned to each range deployed anchors and mooring lines at each of the profiling stations. The mooring lines were attached to large inflated buoys for retrieving the lines during each sampling period. The boat moved into position at each of the buoys and used the anchored line to hold a steady position in the current while data collection was being performed. The data at each station were obtained hourly whenever possible. At each station, the current speed, direction, and salinity data were recorded electronically on a computer and by hand on data log sheets.

Salinity water samples

Water samples were collected during each profile at a minimum of three depths: bottom, middepth, and surface. The bottom sample was obtained approximately 0.6 m above the actual bottom. The middepth sample was obtained at the actual middepth measurement. The surface sample was obtained at approximately 0.9 m below the water surface. Where the water depth was greater than 11 m, samples were also taken at the quarter and three-quarter depths. These water samples provided a field check of the salinity readings of the current meter and also were used as an indicator of the suspended sediment concentrations in the water column. The samples were obtained by pumping the water from the desired depth to a collection point at the surface. The pumping system used is described in the suspended sediment samples section of Appendix A.

Laboratory analysis of water samples for salinities

The individual water samples collected during the intensive survey were analyzed for salt content in the laboratory at the U.S. Army Engineer Waterways Experiment Station (WES). The analysis techniques used are described in the Laboratory Equipment and Sample Analysis section of Appendix A.

Long-term field investigation equipment service procedures

At approximately 30-day intervals, all water-level, salinity, and velocity equipment was cleaned and checked for proper operation, new batteries installed, stored data retrieved, and new recording media installed where applicable. One major problem encountered with long-term unattended operation types of deployments is the accidental destruction of the submerged instruments and moorings by commercial fishing activities and local vessel traffic. The Delaware Bay area contains very busy commercial fishing, transportation, and recreational industries. Various means were employed to protect the instruments from vandalism and accidental encounters with local navigation traffic. The deployment locations were marked with large, highly visible surface floats. They were registered with the local U.S. Coast Guard (USCG) and were published in the USCG "Local Notice to Mariners."¹ However, despite these precautions, several current meters and salinity meters were lost. Figure 4 presents a deployment time-history of all the equipment locations for the study period.

Quality control/data quality assurance

During the scheduled instrument maintenance intervals, techniques were employed to provide information on the quality of the data obtained. The data collected included calibration verification of the salinity meters using a known calibration standard at a temperature of 25 °C. The information provided a determination of the changes to the relative accuracy of the instruments due to the effects of biological growth on the salinity sensors.

¹ Monthly publication that lists hazards to navigation on major U.S. Waterways.

| Station | Instrumentation | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct |
|-----------|--------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| S0.8 | - ENDECO water level recorder | | | | | | | | | | | | | |
| S1.2 (20) | - Hydrolab water quality probe | | | | | | | | | | | | | |
| S1.2 (80) | - Hydrolab water quality probe | | | | | | | | | | | | | |
| S1.3 (20) | - Hydrolab water quality probe | | | | | | | | | | | | | |
| S1.3 (50) | - Hydrolab water quality probe | | | | | | | | | | | | | |
| S1.3 (99) | - Hydrolab water quality probe | | | | | | | | | | | | | |
| S1.4 (20) | - Hydrolab water quality probe | | | | | | | | | | | | | |
| S1.4 (50) | - Hydrolab water quality probe | | | | | | | | | | | | | |
| S1.4 (80) | - Hydrolab water quality probe | | | | | | | | | | | | | |
| S1.8 (20) | - Hydrolab water quality probe | | | | | | | | | | | | | |
| S1.8 (50) | - Hydrolab water quality probe | | | | | | | | | | | | | |
| S1.8 (60) | - ENDECO 174 current meter | | | | | | | | | | | | | |
| S1.8 (99) | - Hydrolab water quality probe | | | | | | | | | | | | | |
| S3.5 (20) | - Hydrolab water quality probe | | | | | | | | | | | | | |
| S3.5 (60) | - ENDECO 174 current meter | | | | | | | | | | | | | |
| S3.5 (80) | - Hydrolab water quality probe | | | | | | | | | | | | | |
| S3.9 (20) | - Hydrolab water quality probe | | | | | | | | | | | | | |
| S3.9 (60) | - ENDECO 174 current meter | | | | | | | | | | | | | |
| S3.9 (80) | - Hydrolab water quality probe | | | | | | | | | | | | | |
| S3.9 | - ENDECO water level recorder | | | | | | | | | | | | | |
| S4.8 (20) | - Hydrolab water quality probe | | | | | | | | | | | | | |
| S4.8 (60) | - ENDECO 174 current meter | | | | | | | | | | | | | |
| S4.8 (80) | - Hydrolab water quality probe | | | | | | | | | | | | | |
| S4.9 (20) | - Hydrolab water quality probe | | | | | | | | | | | | | |
| S4.9 (60) | - ENDECO 174 current meter | | | | | | | | | | | | | |
| S4.9 (80) | - Hydrolab water quality probe | | | | | | | | | | | | | |
| S6.2 (20) | - Hydrolab water quality probe | | | | | | | | | | | | | |
| S6.2 (50) | - Hydrolab water quality probe | | | | | | | | | | | | | |
| S6.2 (80) | - Hydrolab water quality probe | | | | | | | | | | | | | |
| S6.2 (99) | - Hydrolab water quality probe | | | | | | | | | | | | | |
| S6.3 (20) | - Hydrolab water quality probe | | | | | | | | | | | | | |
| S6.3 (50) | - Hydrolab water quality probe | | | | | | | | | | | | | |
| S6.3 (99) | - Hydrolab water quality probe | | | | | | | | | | | | | |
| S6.4 | - ENDECO water level recorder | | | | | | | | | | | | | |

Figure 4. Equipment deployment log

3 Data Presentation

Short-term Data Collection

Water-surface measurements

The tidal variation, or water-surface elevation data, observed during the fall and spring intensive data collection efforts are shown in the time-history plots of the water-surface data during the months of October 1992 and April 1993 (see Plates 1 and 2). Water-level recorders S0.8, S3.9, and S6.4 appeared to function properly during each survey period.

The data from location S0.8 were used as a reference station for comparison with the data from the other stations to estimate tidal phase and range differences between the entrance and the upper reaches of Delaware Bay. This comparison illustrated that tide ranges observed were small, with the maximum tidal range observed: 1.59 m at S0.8, 1.10 m at S3.9, and 0.92 m at S6.4 from 6 through 19 October 1992. The observed maximum tidal ranges from April 5 through 19, 1993 were 1.7 m at S0.8, 1.4 m at S3.9, and 1.3 m at S6.4. The comparison also showed a tide phase difference of 2 hr between S0.8 and S3.5 at the time of high water. The high-water time lag between S0.8 and S6.4 was 3 hr.

Over-the-side velocity measurements

Plates 3 through 52 are time history plots of the over-the-side current speed data obtained during the October 1992 data collection period. Plates 53-124 are time-history plots of the velocity data for each range during the April 1993 data collection period. The ebb and flood directions in the plots were determined from the direction of the current relative to the orientation of the range from the north azimuth. The current directions which indicated ebb flow were identified with a negative value of current speed. The ebb and flood directions were 90 deg from the azimuth orientation of the data collection range.

The maximum velocity observed at the lower range R1.0 was a surface measurement of 122 cm/sec during ebb flow at Station S1.0C and 122 cm/sec during flood flow at S1.0C on April 21 and 24, respectively. The maximum

velocity observed at range R2.0 was a surface measurement of 90 cm/sec during flood flow at Station S2.0A on 30 April 1993. Range R3.0 had the higher surface velocities (200 - 280 cm/sec) during peak ebb and flood flow periods. These velocities were observed on several days during both the October 1992 and April 1993 data collection periods. The maximum velocities observed at the upper range R7.0, in the Delaware River, were surface measurements of 200 to 225 cm/sec at Station S7.0A and S7.0B during several days of the October 1992 data collection period.

Weather played a significant role in the data collection effort. High sustained winds in the open areas of Delaware Bay made data collection difficult and unsafe due to severe wave action. These occurrences can be identified by the small number of data points on a particular plot and by missing sequences of days at particular data collection ranges.

High freshwater inflow from flooding on the Delaware River contributed to the flow in the channel prior to the initiation of the April 1993 data collection effort. However, due to the large size of Delaware Bay, the increased freshwater inflow at the time of the survey did not cause large nontidal variations in the magnitude and direction of the currents. There were no significant eddies or unusual flow circulation patterns observed at any of the stations. Well-defined depth gradients of velocity were evident at almost every data collection range.

Fixed-depth velocity measurements

Time-history plots of the current speeds and salinities from the fixed-depth current meters for the entire year of data collection are shown in Plates 125 through 154. The time-history plots of the periods of each 2-week data collection period are shown in Plates 125, 126, 137, and 147 for October 1992 and Plates 131 and 152 for April 1993. The maximum current speed observed (120 cm/sec) occurred at meter location S3.5 as indicated in Plate 126. The magnitudes and directions of the current speeds observed for all the current meter deployment locations generally agreed very closely with the information obtained from nearby over-the-side velocity data collection ranges. This is evidenced by a comparison of Plate 147 with Plate 36. The ebb and flood directions shown in the fixed-depth current meter time-histories were determined by the same techniques used for the over-the-side velocity data.

Salinity measurements

The time-history plots of salinity profiles during the October 1992 and April 1993 data collection periods are shown in Plates 155 through 275. General observations on the salinity data indicated significant differences in the maximum near-surface salinity values. The observed maximum salinities for the data collection ranges R1.0 and R7.0 were 31.0 ppt and 0.0 ppt, respectively. Likewise, the minimum near-surface salinity values were 23.2 ppt and

0.0 ppt for ranges R1.0 and R7.0, respectively. Vertical stratification of salinity was widely varied over the 2-week period in October 1992. Salinity values at the profile locations within Delaware Bay, Delaware River, and the C&D Canal indicate that flows within ranges R1.0, R2.0, R3.0, R4.0, R5.0, and R7.0 were partially to well-mixed. Only range R6.0 was observed to have a significant salinity stratification. Variations in degree of stratification for most of the data collection ranges are shown in Plates 205 through 275. With the exception of ranges R4.0, R5.0, and R7.0, a specific salinity stratification could be observed for the stations nearest the deep water of the navigation channel. Distinct vertical salinity stratification generally occurred during the ebb tide phase, and partial mixing generally occurred during the flood tide phase.

Long-term Field Investigation

Water-level measurements

Water-level elevation data for the long-term field investigation are plotted in Plates 276 through 288. As with any long-term deployment of instrumentation for data collection, periods of equipment malfunction occurred. Figure 4 presents a time-history log of the operation of all the equipment installed in the Delaware Bay Study area. Water-level recorders S0.8, S3.9, and S6.4 functioned properly during most of the data collection period. The percent of time in service over the investigation period for these instruments ranged from 90 through 100 percent.

The data display the spring and neap tide extremes for the system during the period of the study. The zero datum indicated in the plots is an arbitrary datum and is not referenced to any mllw elevation. The maximum one-cycle tide range observed at location S0.8 was 2.0 m and occurred between March 14 and 15, 1993. At this same time, the maximum one-cycle tide range observed in the C&D Canal (S3.9) and Chesapeake Bay (S6.4) was approximately the same at 1.6 m. However, these tide ranges include not only astronomical tides but meteorological forcing from a strong frontal passage. This is evidenced in many of the plots of the tide data.

Fixed-depth velocity measurements

Time-histories of the current speeds and salinities during the long-term data collection period are shown in Plates 125 through 154. The history of the current meters operation at each deployment location is shown in Figure 4. During a few of the equipment service trips, some of the meter deployments were missing from the support floats, an indication that the meter had been resting on the bottom and not recording any velocities. The effect of this is evident in Plates 126 and 128 where the velocity values are changing as anticipated and then suddenly develop a consistent zero reading. Another problem encountered often was that the impeller may have been fouled by floating

debris which eventually became dislodged, allowing the meter to begin functioning properly. An example of this is seen in Plate 138.

Peak magnitudes of current speeds ranged from 25 to 120 cm/sec. It should be noted that the ebb flow direction (-) for stations S3.5, S3.9, S4.9, S4.8 indicates flow in the C&D Canal toward Delaware Bay, and the flood flow direction (+) is toward Chesapeake Bay.

Salinity measurements

Continuous recording of salinity concentrations was made at the locations of the fixed-depth current meters, some of the tide gages and at the salinity recorders. The salinities measured from the fixed-depth current meter deployments are shown in Plates 125 through 154. The salinities recorded by the Hydrolab Datasonde 3 water quality data logger are shown in Plates 289 through 346. The salinity recordings at tide gage station S0.8 during the long-term field investigation are shown in Plates 347 through 351.

Biological fouling of the salinity sensors is one of the major contributors to the differences seen in the quality control values and the recorded information. An example can be seen in Plates 296 and 297 and 300 and 301. The salinity will generally show a slight increase in readings immediately after the sensor has been serviced. This is due to the removal of the marine growth and recalibration of the sensor with the known salinity standard.

The salinity concentrations in the lower part of Delaware Bay (stations S1.2, S1.3, and S1.4) ranged from 22 to 33 ppt. In the midbay area of Delaware Bay (station S1.8), the salinity concentrations ranged from 12 to 28 ppt. In the C&D Canal, the concentrations ranged from 0 to 11 ppt. At the Annapolis Bay bridge, the salinity concentrations had a ranged from 1 to 20 ppt.

The effect on salinity concentrations from the extremely large influx of fresh water from the Delaware River and tributaries into Delaware Bay between April and May 1993 could not be determined from the long-term data due to losses of the salinity recording instrumentation. Several of the salinity recorders also developed mechanical problems and failed to record any data during certain portions of the deployment period. These specific periods and locations are indicated in Figure 4. The percent of time in service over the duration of the investigation for the Hydrolab Datasonde 3 water quality data loggers ranged from 2 to 100 percent.

4 Summary

The data presented herein were collected from several 2-week intensive surveys and a 1-year long-term sampling effort within Delaware Bay. The following observations were made:

- a.* During the short-term data collection periods (October 1992 and April 1993), the maximum range of tide occurred at station S0.80 was 1.45 m. The maximum one-cycle range of tide was 1.4 m. at station S3.9 and 1.3 m for station S6.4.
- b.* The average tide range over the long-term field investigation (19 October 1992 - 15 October 1993) for the tide gage located near the Delaware Bay entrance channel, S0.8, was 1.3 m. The average tide ranges for the tide gages located at stations S3.9 and S6.4 were 1.3 m and 0.6 m, respectively. The maximum one-cycle tide range observed (2.0 m) occurred at tide gage S0.8.
- c.* Maximum velocities observed for the two short-term data collection periods occurred at the strength of ebb of the tidal cycle. The maximum recorded velocities of 200-280 cm/sec were observed near the surface at range R3.0. The velocities obtained from the fixed-depth current meters were in general agreement with those values measured from the over-the-side data collection equipment.
- d.* Salinity concentrations obtained during the short-term and long-term data collection periods indicated that the lower portion of the bay could be described as being well-mixed, while the upper portions could be described as being partially to well-mixed.

Table 1
Long-term Monitoring Equipment Types and Locations

| Station No. | Instrument Type | Data Collected | Depth of Deployment | Latitude/ Longitude | Period of Deployment |
|-------------|-----------------|-------------------------------------|---------------------|----------------------------|--------------------------------|
| S0.8 | ENDECO 1152 | Water levels Salinity | Near-surface | 38° 47' 22" 75° 06' 10" | 10/92 - 10/93 |
| S1.2 | DATASONDE 3 | Salinity | 20 % of depth | 38° 56' 12" 75° 03' 27" | 11/92 - 01/93 |
| | " | " | 80% of depth | " | " |
| S1.3 | DATASONDE 3 | Salinity | 20 % of depth | 38° 51' 13" 75° 07' 11" | 10/92 - 12/92 |
| | " | " | 50 % of depth | " | " |
| | " | " | 80 % of depth | " | " |
| S1.4 | DATASONDE 3 | Salinity | 20 % of depth | 38° 52' 11" 75° 06' 54" | 03/93 - 04/93 |
| | " | " | 50 % of depth | " | 06/93 - 10/93 |
| | " | " | 80 % of depth | " | 03/93 - 07/93 |
| S1.8 | DATASONDE 3 | Salinity | 20 % of depth | 32° 09' 31" 75° 15' 23" | 10/92 - 11/92 04/93 - 10/93 |
| | " | " | 50 % of depth | " | " |
| | " | " | 80 % of depth | " | " |
| | ENDECO 174 | Velocity, Direction, Salinity | 60 % of depth | " | " |
| S3.2 | DATASONDE 3 | Salinity | 20 % of depth | 39° 27' 35" 75° 34' 14" | 04/93 |
| | " | " | 80 % of depth | " | " |
| S3.5 | DATASONDE 3 | Salinity | 20 % of depth | 39° 33' 31" 75° 34' 23" | 10/92 - 10/93 |
| | " | " | 80 % of depth | " | " |
| | ENDECO 174 | Velocity, Direction Salinity | 60 % of depth | " | " |
| S3.9 | DATASONDE 3 | Salinity | 20 % of depth | 39° 32' 30" 75° 44' 30" | 10/92 - 10/93 |
| | " | " | 80 % of depth | " | " |
| | ENDECO 174 | Velocity, Direction Salinity | 60 % of depth | " | " |
| | ENDECO 1029 | Water level | Near-surface | " | " |
| S4.8 | DATASONDE 3 | Salinity | 20 % of depth | 39° 31' 45" 75° 51' 43" | 01/93 - 10/93 |
| | " | " | 80 % of depth | " | " |

(Continued)

Table 1 (Concluded)

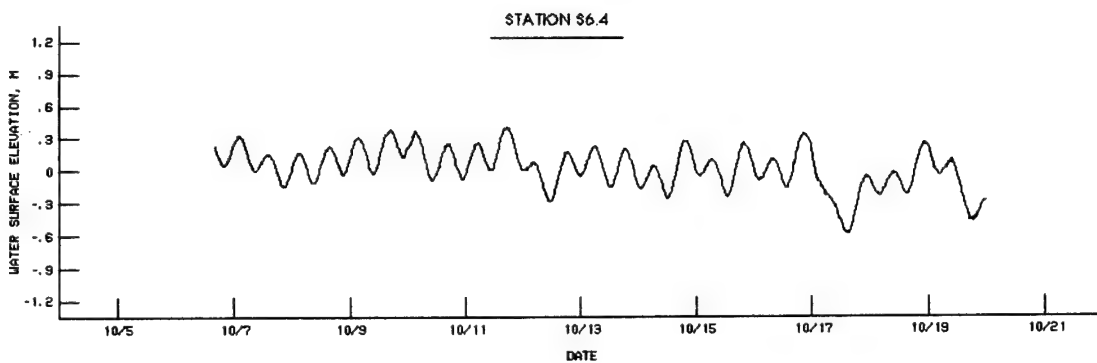
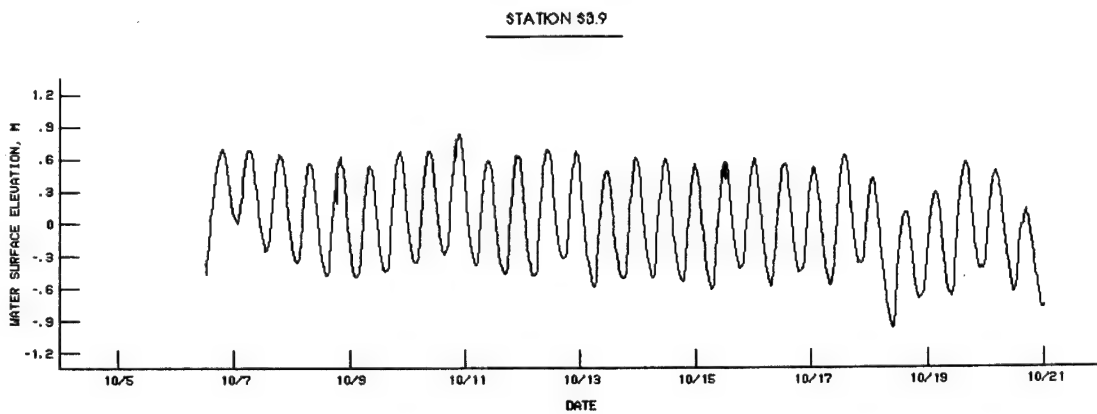
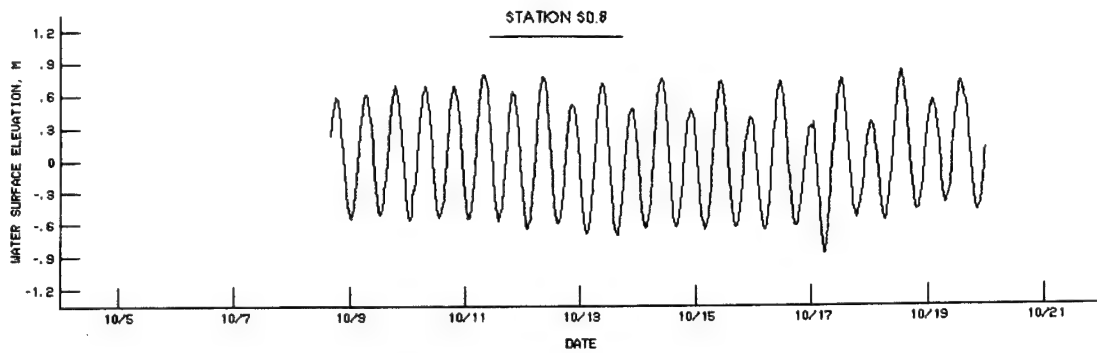
| Station No. | Instrument Type | Data Collected | Depth of Deployment | Latitude/ Longitude | Period of Deployment |
|-------------|-----------------|------------------------------|---------------------|----------------------------|--------------------------------|
| S4.8 | ENDECO 174 | Velocity, Direction Salinity | 60 % of depth | " | " |
| S4.9 | DATASONDE 3 | Salinity | 20 % of depth | 39° 31' 08" 75° 52' 47" | 10/92 - 12/92 |
| | " | " | 80 % of depth | " | " |
| | ENDECO 174 | Velocity, Direction Salinity | 60 % of depth | " | " |
| S6.2 | DATASONDE 3 | Salinity | 20 % of depth | 38° 59' 38" 76° 23' 18" | 10/92 - 12/92 05/93 - 10/93 |
| | " | " | 50 % of depth | " | 10/92 - 12/92 |
| | " | " | 80 % of depth | " | 06/93 - 10/93 |
| | " | " | 99 % of depth | " | 10/92 - 12/92 |
| S6.3 | DATASONDE 3 | Salinity | 20 % of depth | 39° 59' 07" 76° 21' 13" | 10/92 - 12/92 03/93 - 10/93 |
| | " | " | 50 % of depth | " | " |
| | " | " | 99% of depth | " | " |
| S6.4 | ENDECO 1029 | Water level | Near-surface | 38° 58' 48" 76° 20' 09" | 10/92 - 10/93 |

Table 2
Current Speed, Direction, and Salinity Data Collection Range
Locations

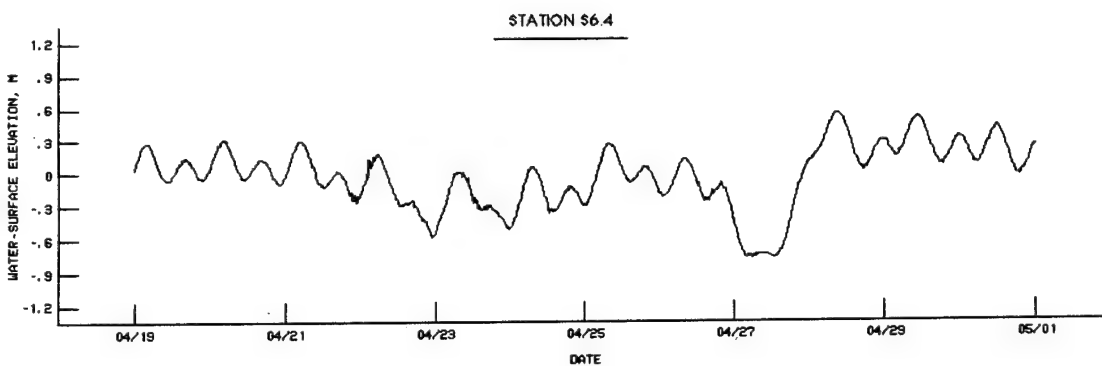
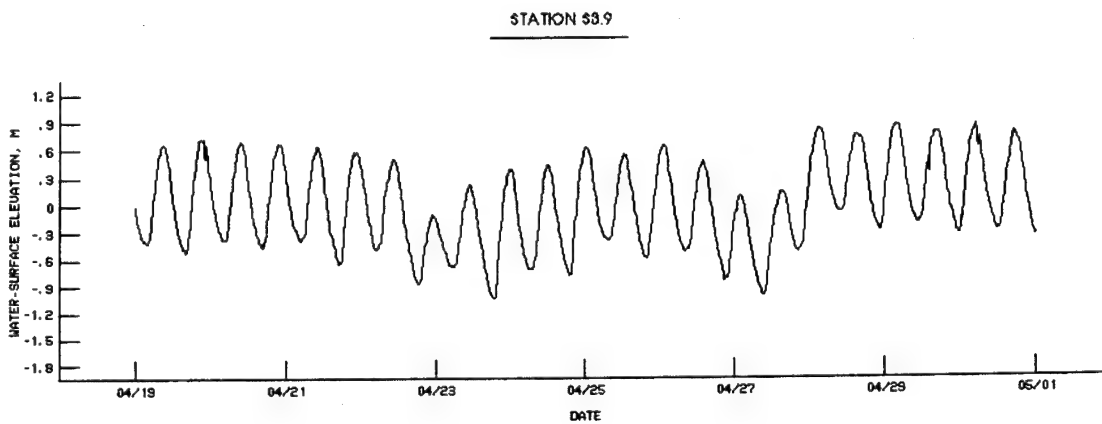
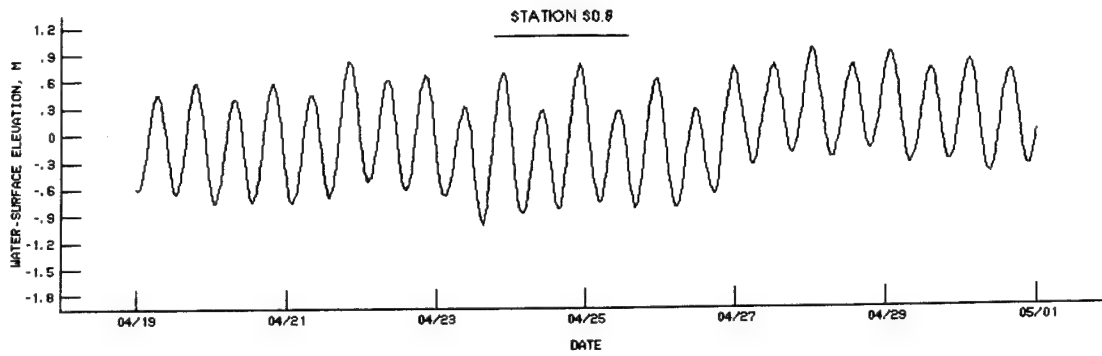
| Range No. | Location | Station No. | Latitude/ Longitude | Period of Data Collection |
|-----------|---|-------------|----------------------------|----------------------------|
| R1.0 | Delaware Bay Entrance Channel | A | 38° 50' 55" 75° 06' 09" | 10/11-25/92 04/19-30/93 |
| | | B | 38° 52' 15" 75° 03' 29" | " |
| | | C | 38° 53' 37" 75° 02' 14" | " |
| | | D | 38° 54' 48" 75° 00' 53" | " |
| R1.5 | Brandywine Shoal at channel markers "16" & "19" | A | 39° 02' 10" 75° 12' 19" | 10/11/92 04/19/93 |
| | | B | 39° 02' 52" 75° 11' 14" | " |
| | | C | 39° 03' 36" 75° 09' 22" | " |
| | | D | 39° 04' 06" 75° 08' 33" | " |
| R2.0 | Between Deepwater Pt, MD, and Nantuxent Pt, NJ | A | 39° 12' 42" 75° 19' 57" | 10/11-25/92 04/19-30/93 |
| | | B | 39° 13' 13" 75° 19' 05" | " |
| | | C | 39° 14' 03" 75° 17' 47" | " |
| | | D | 39° 14' 52" 75° 16' 33" | " |
| R3.0 | Between Bakeoven Pt, DE, and Arnold Pt, NJ | A | 39° 23' 10" 75° 29' 18" | 10/11-25/92 04/19-30/93 |
| | | B | 39° 23' 30" 75° 29' 00" | " |
| | | C | 39° 24' 00" 75° 28' 28" | |
| R4.0 | C&D canal near Summitt Bridge | A | 39° 32' 24" 75° 45' 14" | 10/12-25/92 04/20-30/93 |
| | | B | 39° 32' 37" 75° 45' 16" | |
| R5.0 | West end of C&D canal below Chesapeake City, MD | A | 39° 27' 58" 75° 58' 08" | 10/11-25/92 04/19-30/93 |
| | | B | 39° 28' 01" 75° 58' 15" | " |
| R6.0 | North of Chesapeake Bay Bridge at Annapolis, MD | A | 39° 02' 23" 76° 19' 47" | 10/11-25/92 04/19-30/93 |
| | | B | 39° 02' 24" 76° 21' 14" | " |
| | | C | 39° 02' 24" 76° 22' 47" | " |

(Continued)

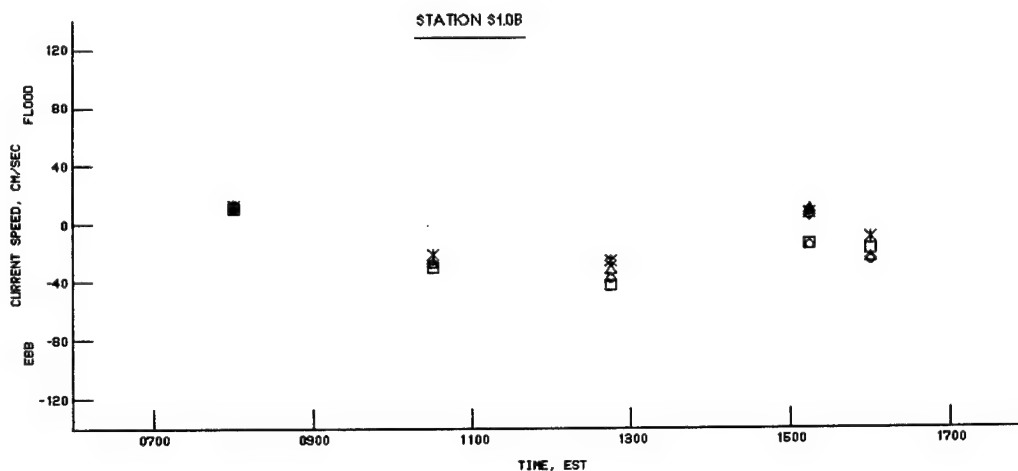
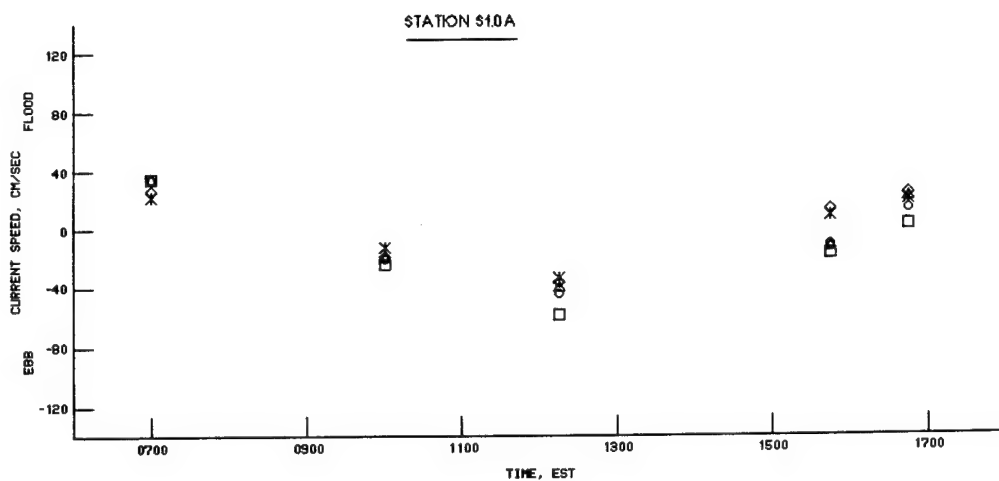
| Table 2 (Concluded) | | | | |
|---------------------|--|-------------|----------------------------|----------------------------|
| Range No. | Location | Station No. | Latitude/ Longitude | Period of Data Collection |
| R7.0 | Delaware River, between New Castle, DE, and Penns Beach, NJ. | A | 39° 39' 23" 75° 32' 49" | 10/11-25/92 04/19-30/93 |
| | | B | 39° 39' 53" 75° 32' 32" | " |



**WATER-SURFACE ELEVATION
STATIONS S0.8, S3.9, AND S6.4
10/05/92 - 10/19/92**

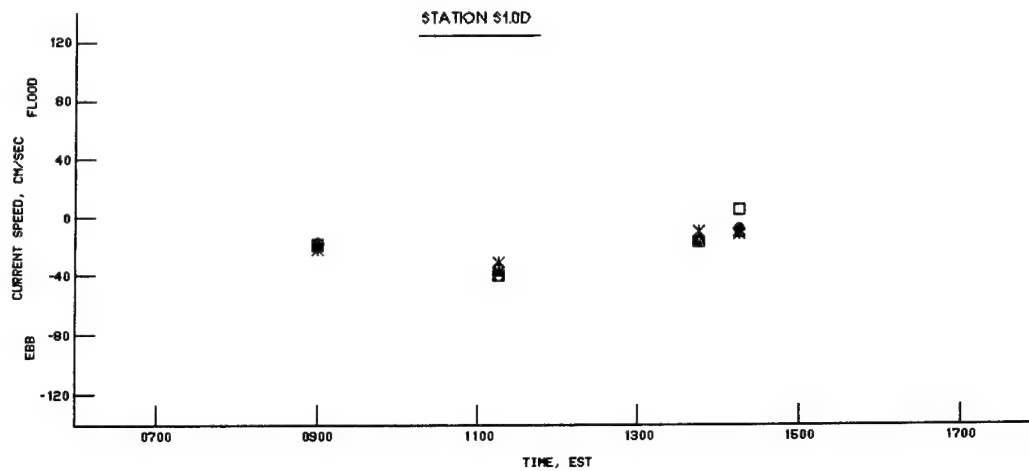
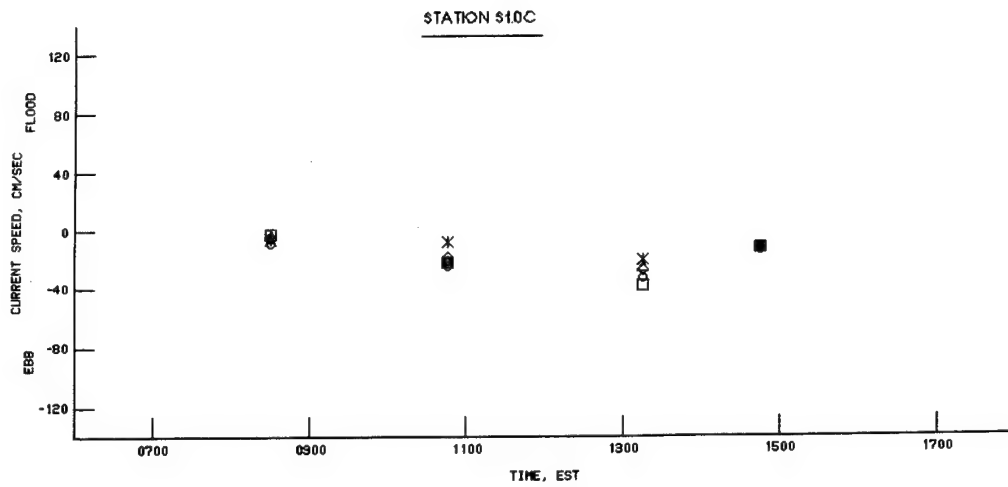


**WATER-SURFACE ELEVATION
STATIONS S0.8, S3.9, AND S6.4
04/19/93 - 04/30/93**



- LEGEND**
- - SURFACE
 - - ONE-QUARTER DEPTH
 - △ - MIDDEPTH
 - ◇ - THREE-QUARTER DEPTH
 - ✕ - BOTTOM

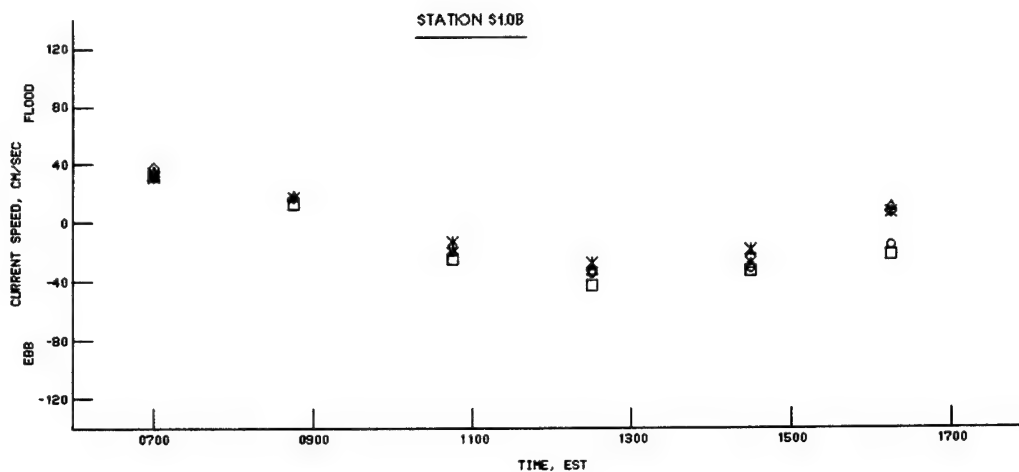
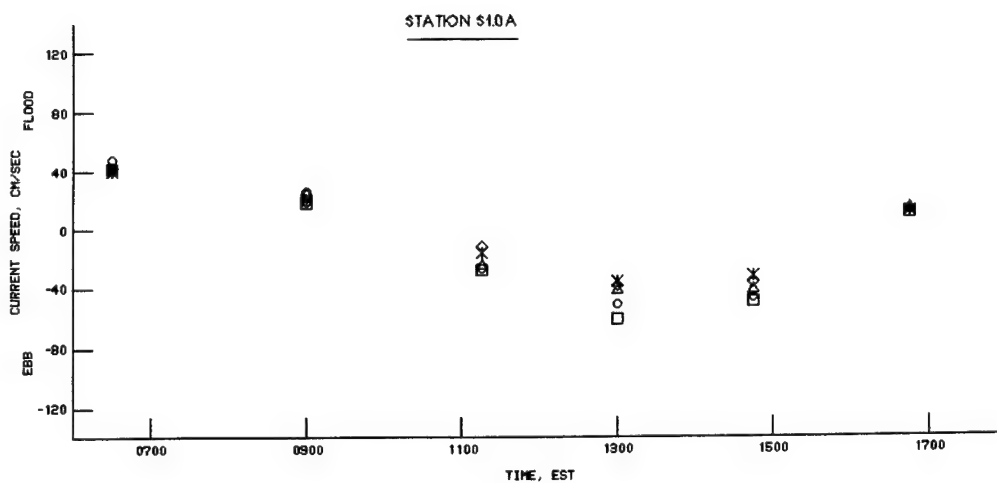
**CURRENT SPEED
STATIONS S1.0A AND S1.0B
10/11/92**



LEGEND

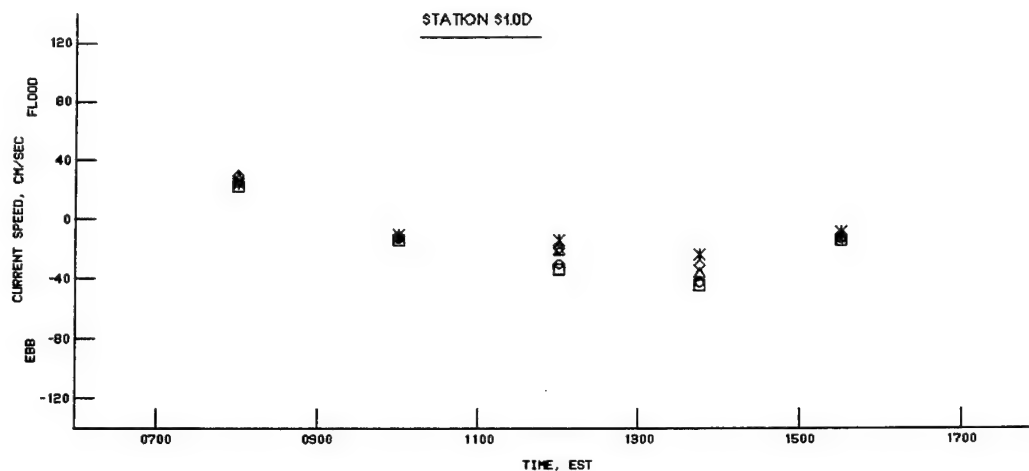
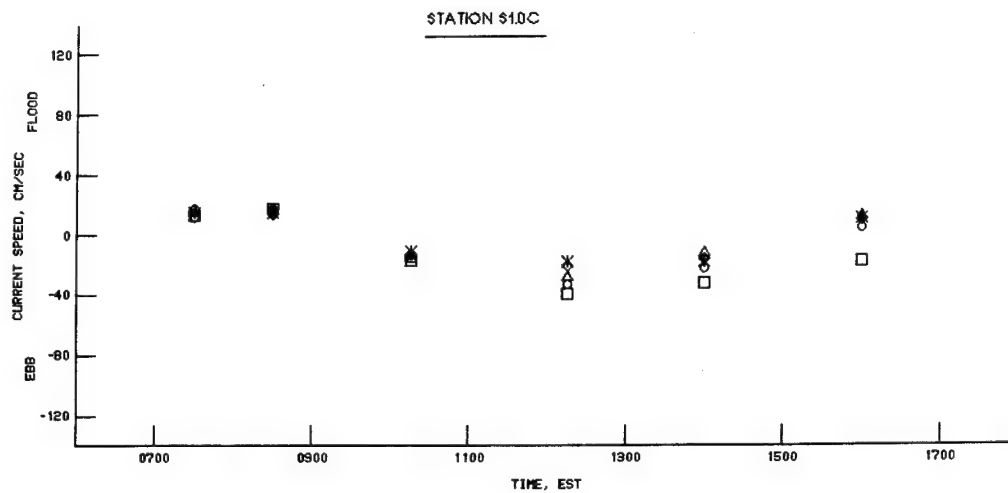
- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- ✱ - BOTTOM

**CURRENT SPEED
STATIONS S1.0C AND S1.0D
10/11/92**



- LEGEND**
- - SURFACE
 - - ONE-QUARTER DEPTH
 - △ - MIDDEPTH
 - ◇ - THREE-QUARTER DEPTH
 - ✕ - BOTTOM

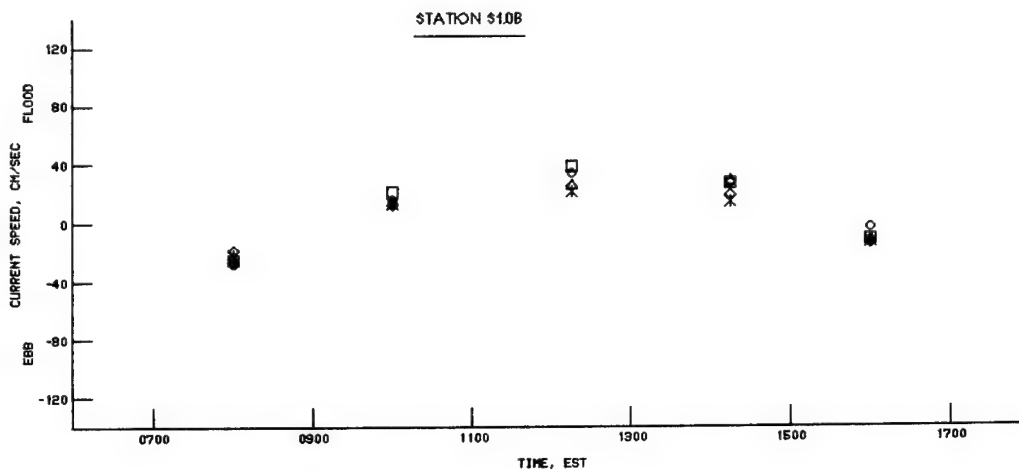
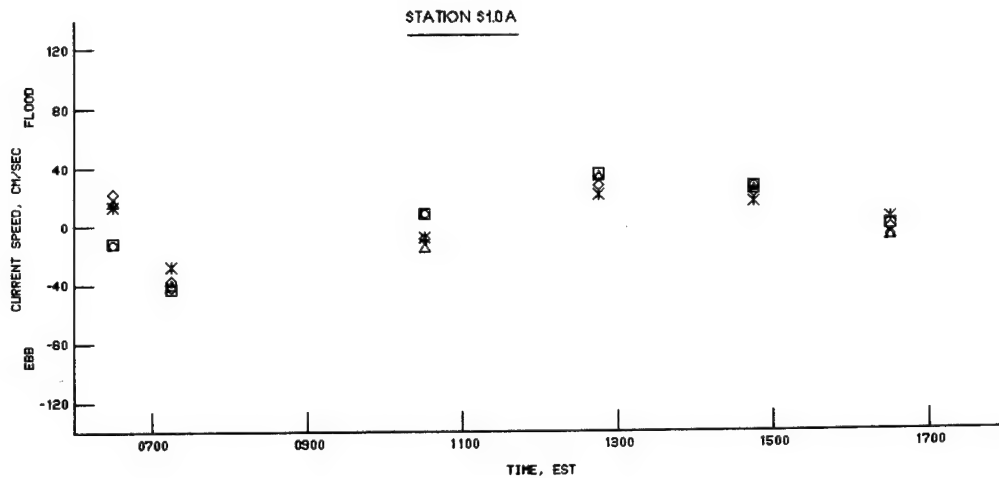
**CURRENT SPEED
STATIONS S1.0A AND S1.0B
10/13/92**



LEGEND

| | |
|---|-----------------------|
| □ | - SURFACE |
| ○ | - ONE-QUARTER DEPTH |
| △ | - MIDDEPTH |
| ◇ | - THREE-QUARTER DEPTH |
| × | - BOTTOM |

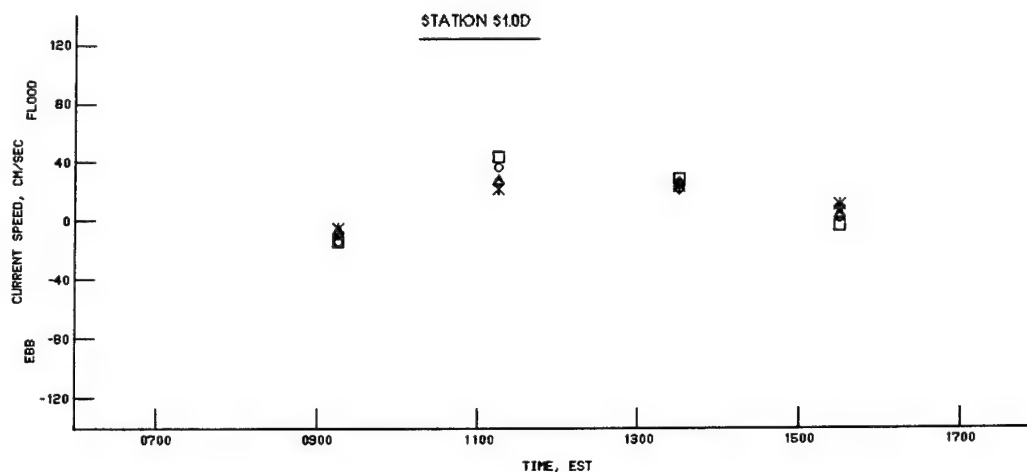
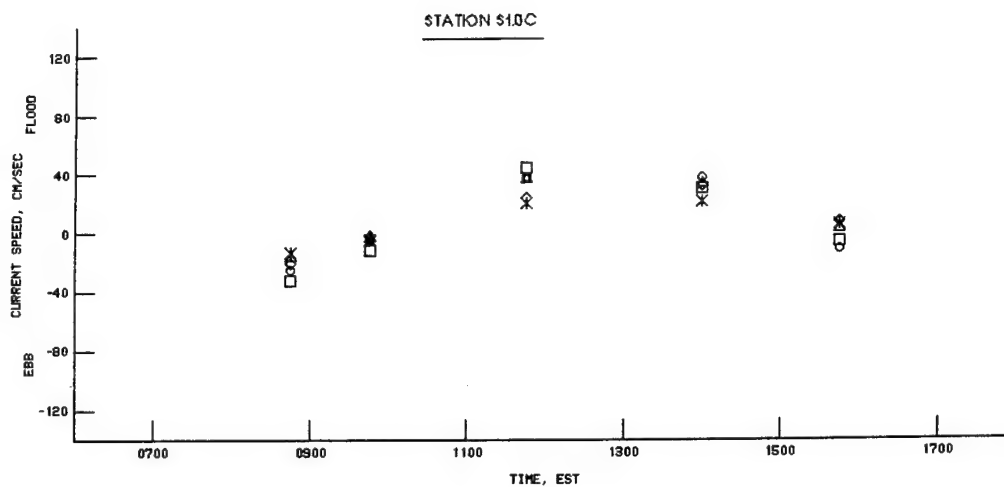
**CURRENT SPEED
STATIONS S1.0C AND S1.0D
10/13/92**



LEGEND

| | |
|---|-----------------------|
| □ | - SURFACE |
| ○ | - ONE-QUARTER DEPTH |
| △ | - MIDDEPTH |
| ◇ | - THREE-QUARTER DEPTH |
| × | - BOTTOM |

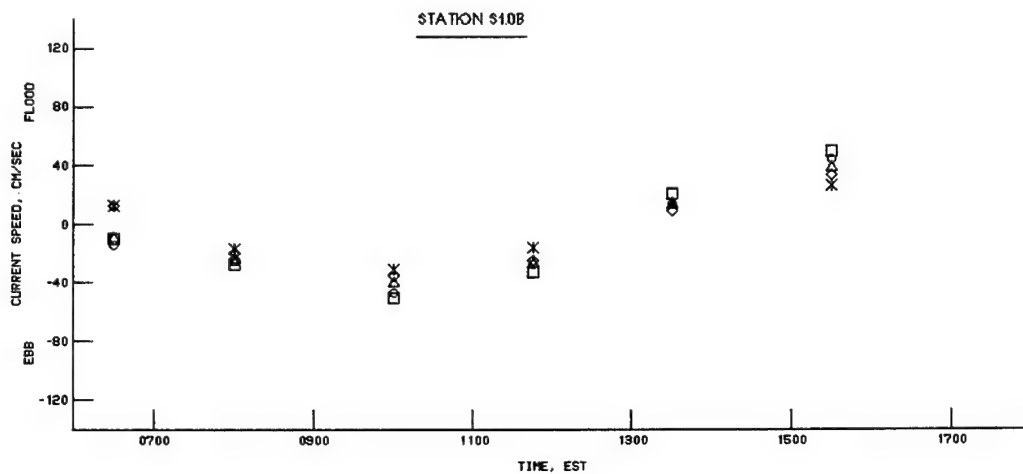
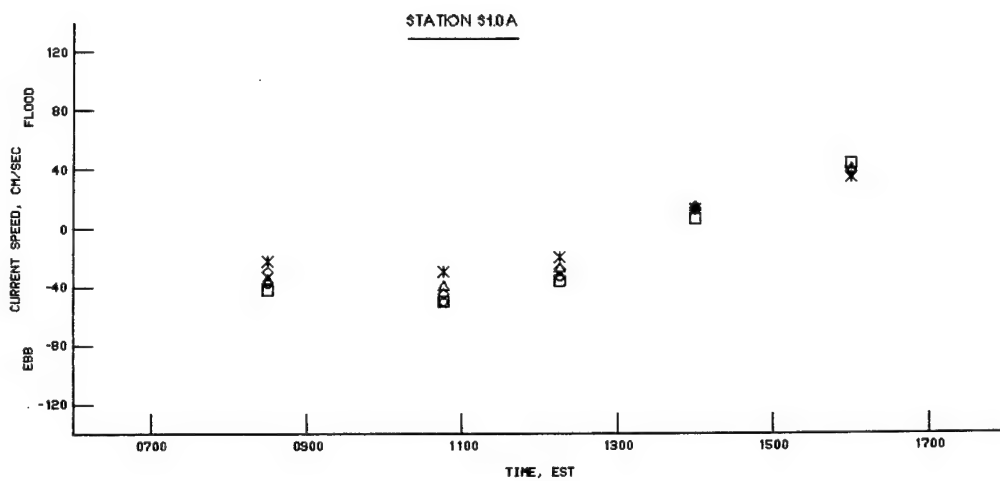
**CURRENT SPEED
STATIONS S1.0A AND S1.0B
10/20/92**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- ✱ - BOTTOM

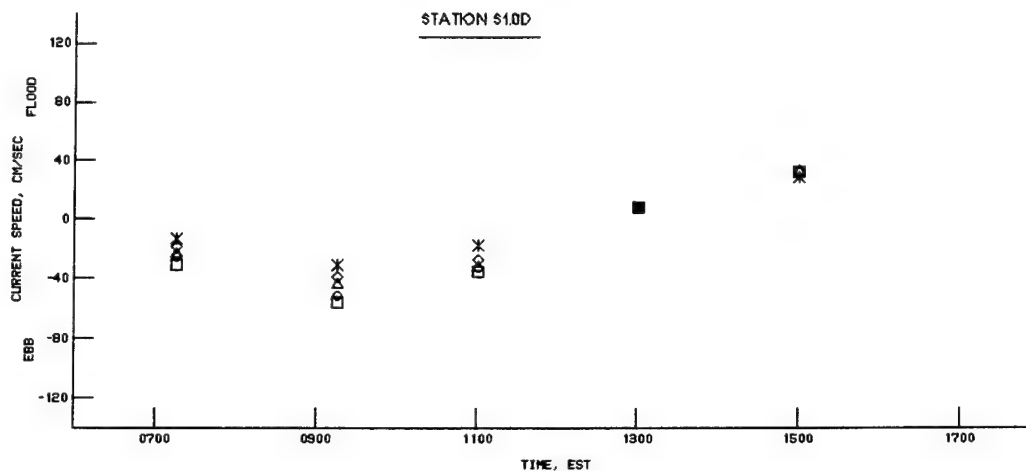
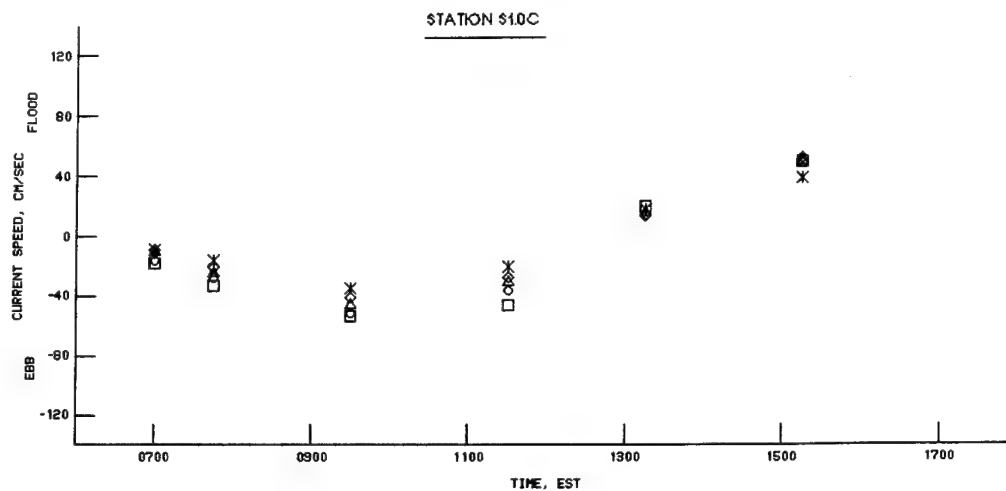
**CURRENT SPEED
STATIONS S1.0C AND S1.0D
10/20/92**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- ✱ - BOTTOM

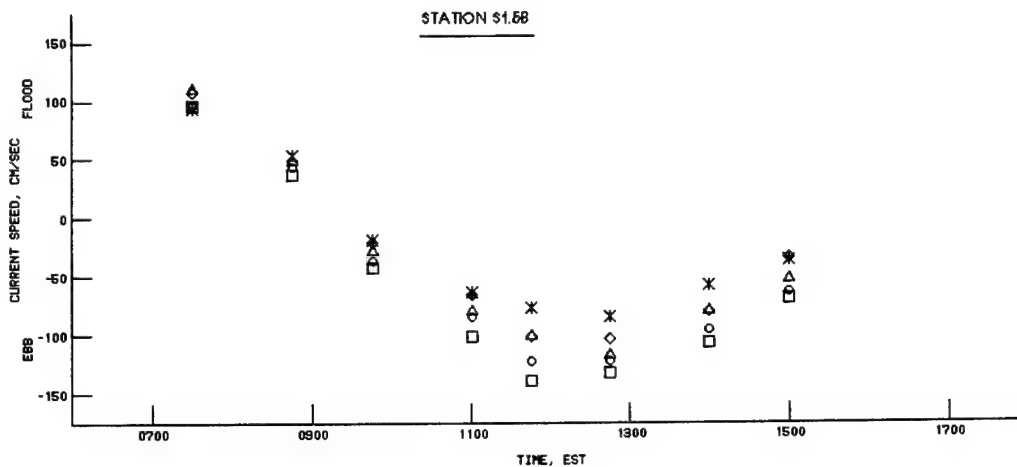
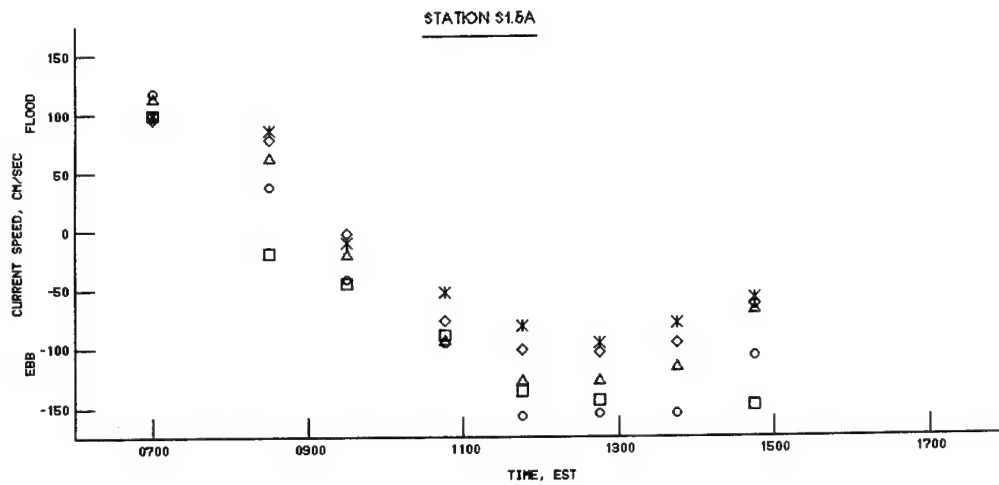
**CURRENT SPEED
STATIONS S1.0A AND S1.0B
10/23/92**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- * - BOTTOM

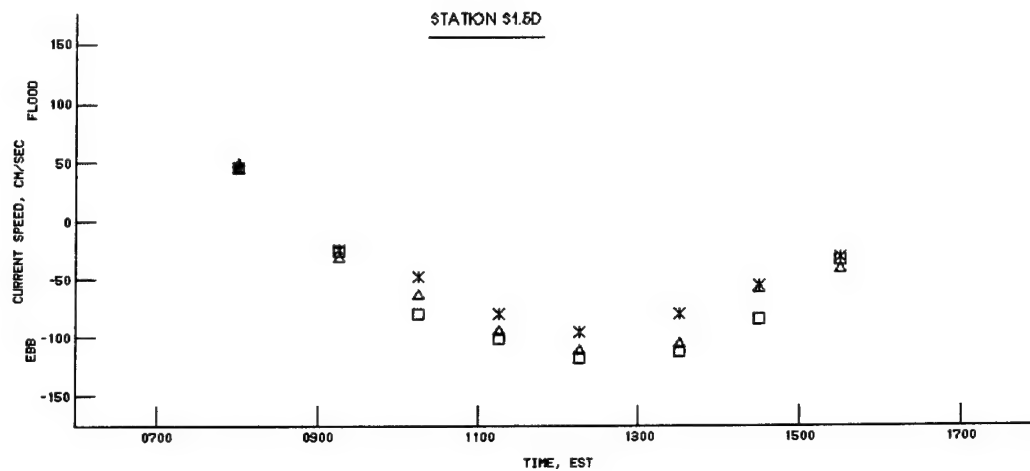
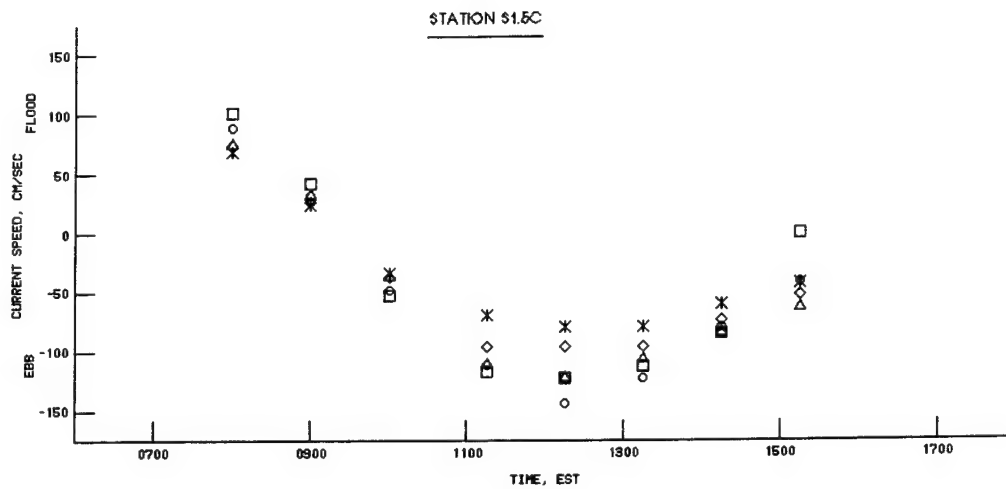
**CURRENT SPEED
STATIONS S1.0C AND S1.0D
10/23/92**



LEGEND

□ - SURFACE
 ○ - ONE-QUARTER DEPTH
 △ - MIDDEPTH
 ◇ - THREE-QUARTER DEPTH
 * - BOTTOM

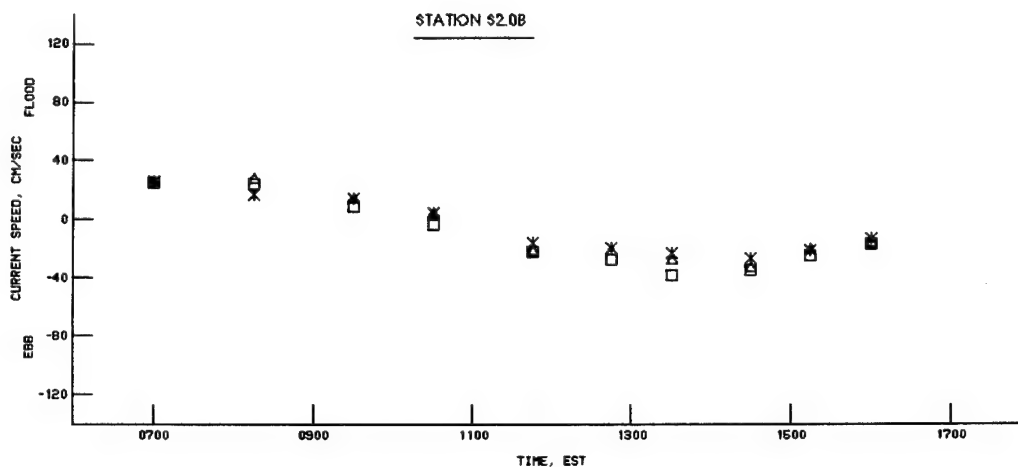
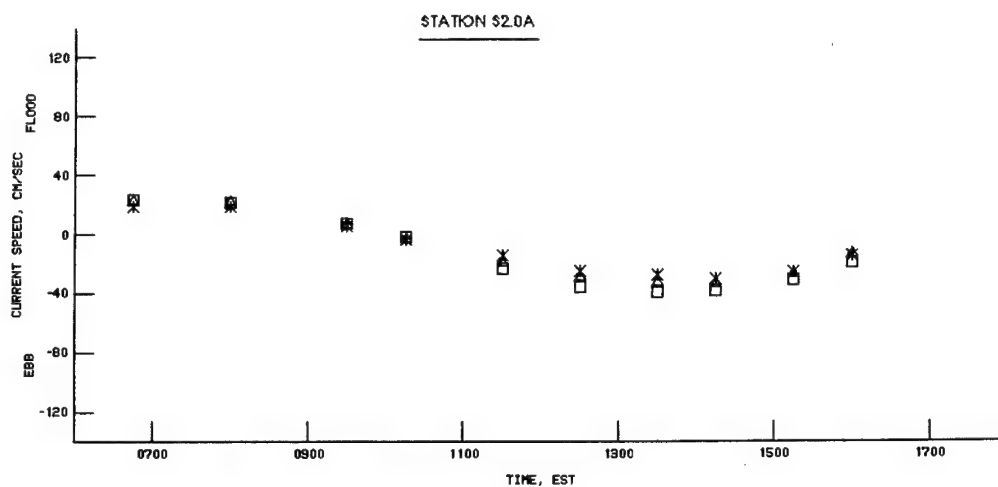
CURRENT SPEED
STATIONS S1.5A AND S1.5B
10/11/92



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- * - BOTTOM

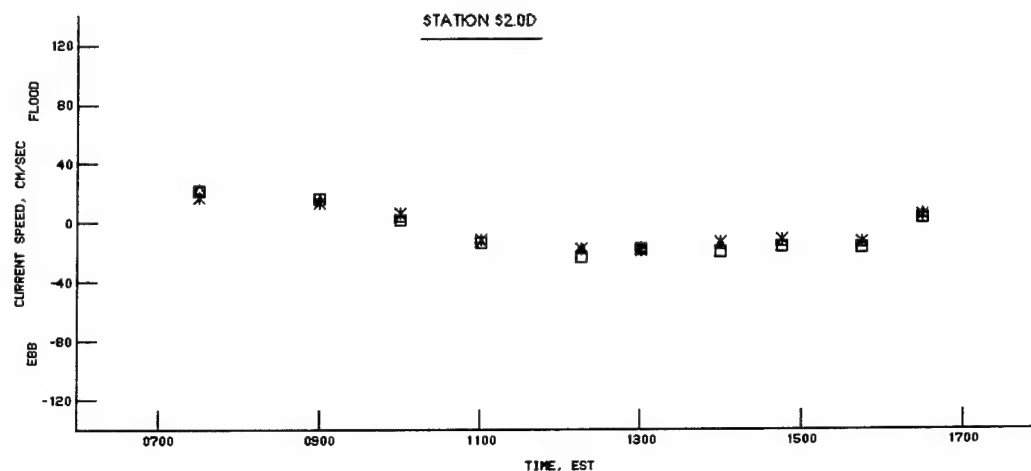
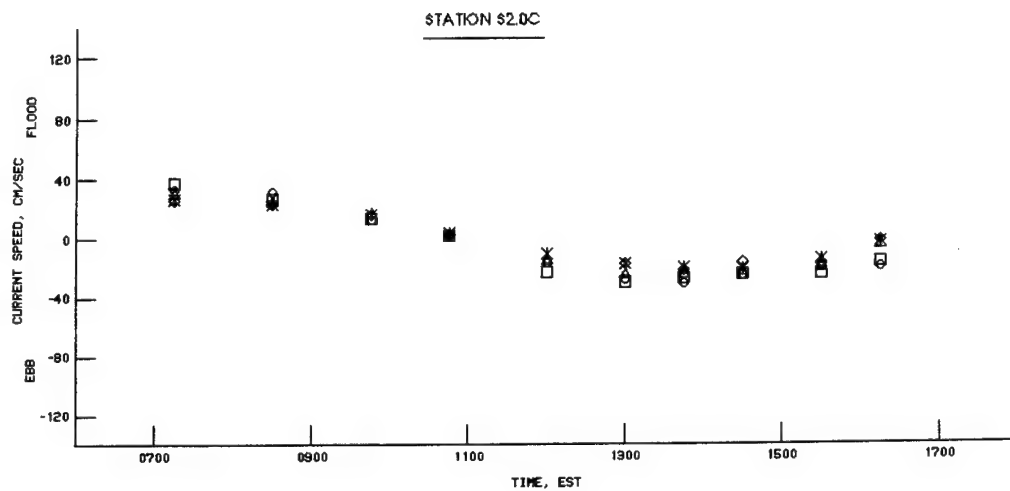
**CURRENT SPEED
STATIONS S1.5C AND S1.5D
10/11/92**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- * - BOTTOM

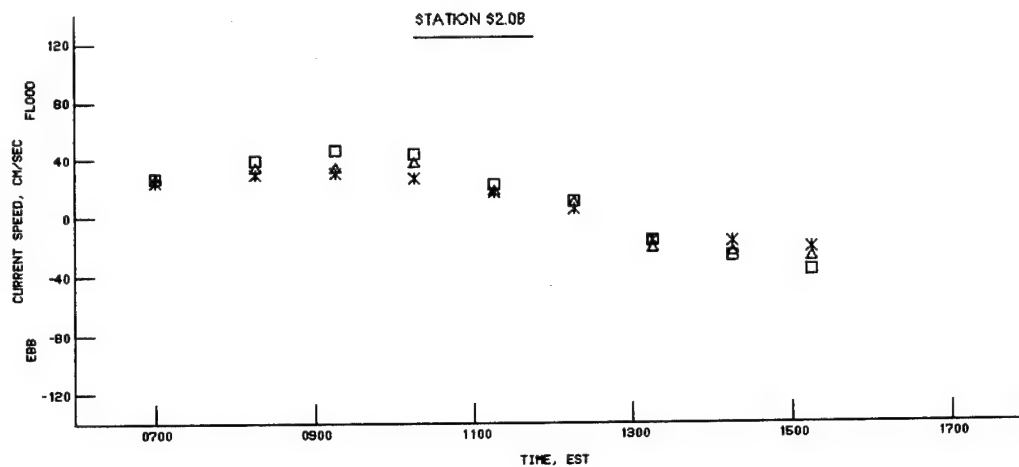
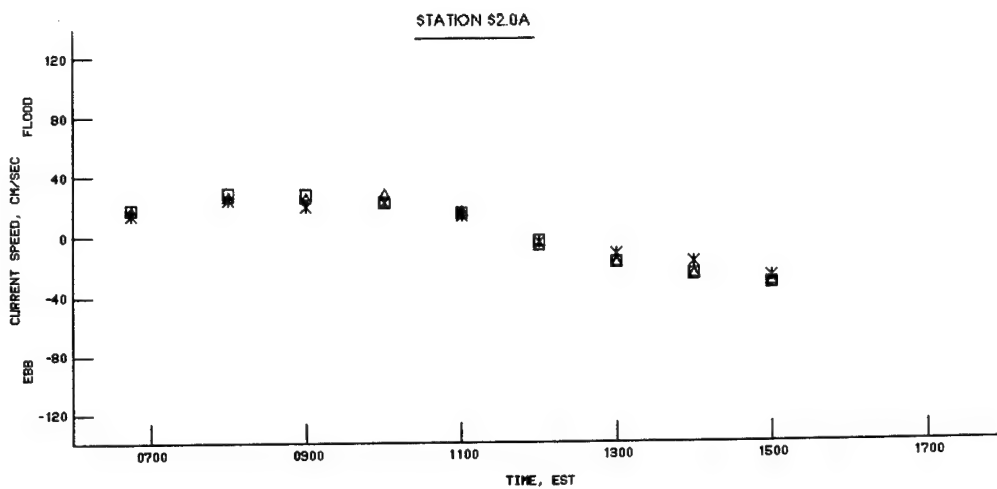
**CURRENT SPEED
STATIONS S2.0A AND S2.0B
10/11/92**



LEGEND

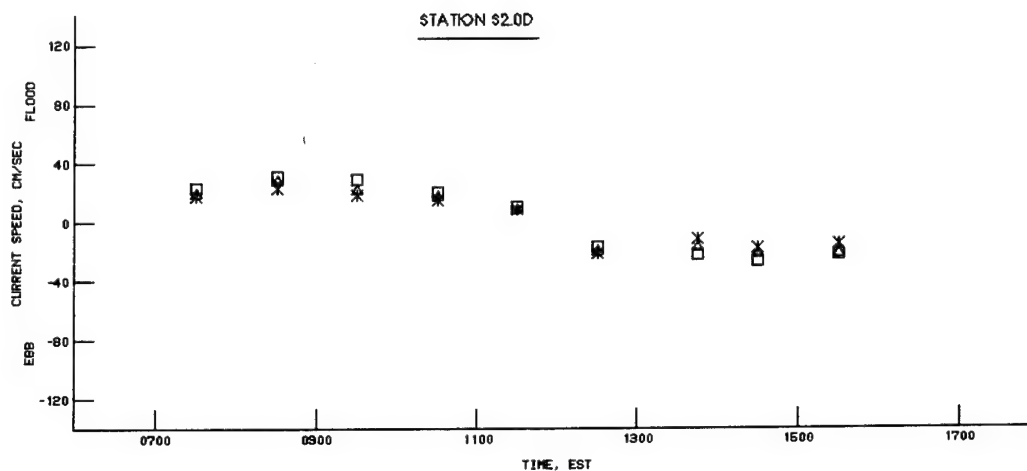
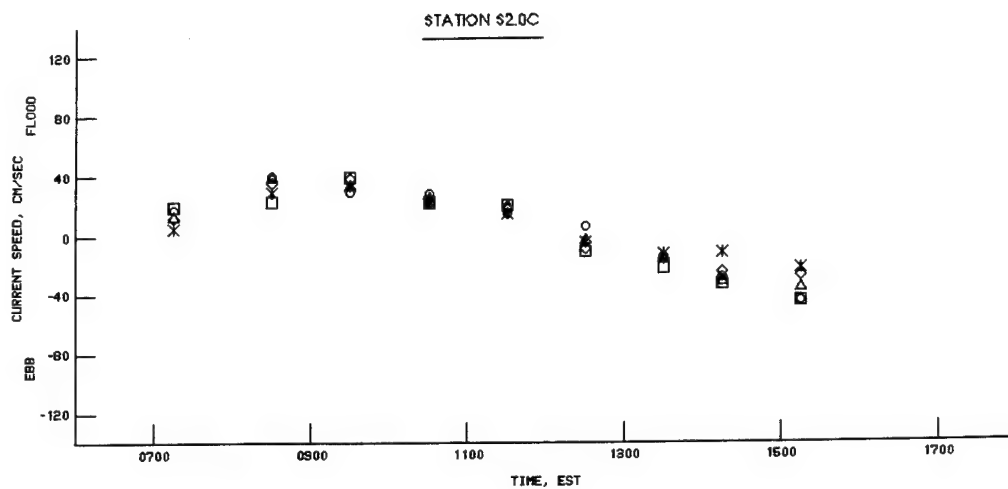
- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- × - BOTTOM

**CURRENT SPEED
STATIONS S2.0C AND S2.0D
10/11/92**



- LEGEND**
- - SURFACE
 - - ONE-QUARTER DEPTH
 - △ - MIDDEPTH
 - ◇ - THREE-QUARTER DEPTH
 - × - BOTTOM

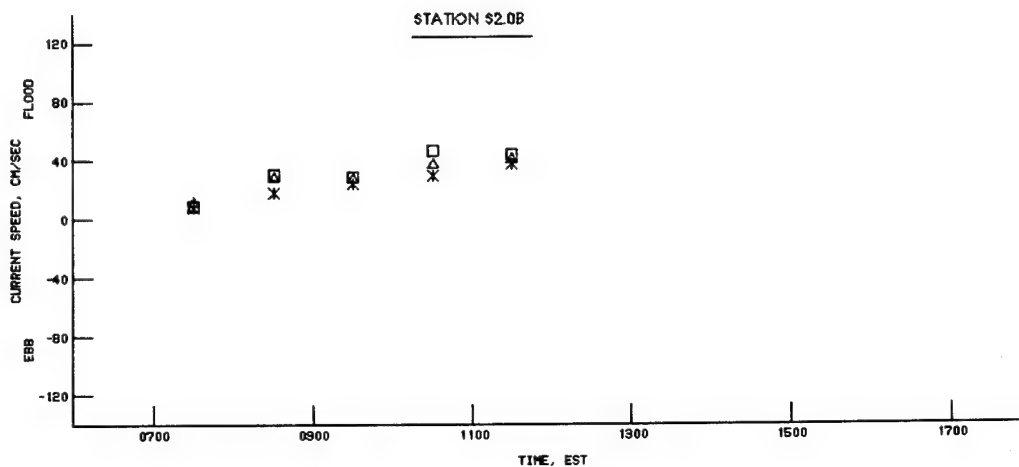
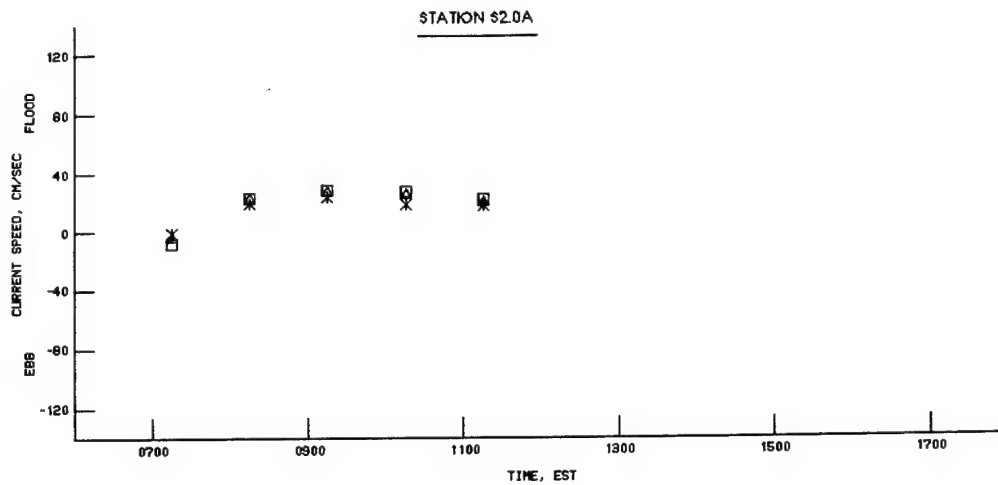
**CURRENT SPEED
STATIONS S2.0A AND S2.0B
10/14/92**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- X - BOTTOM

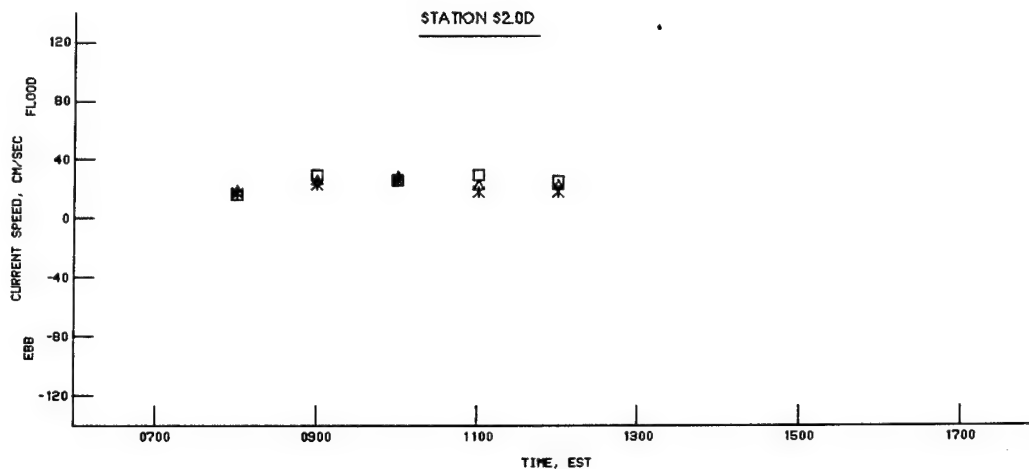
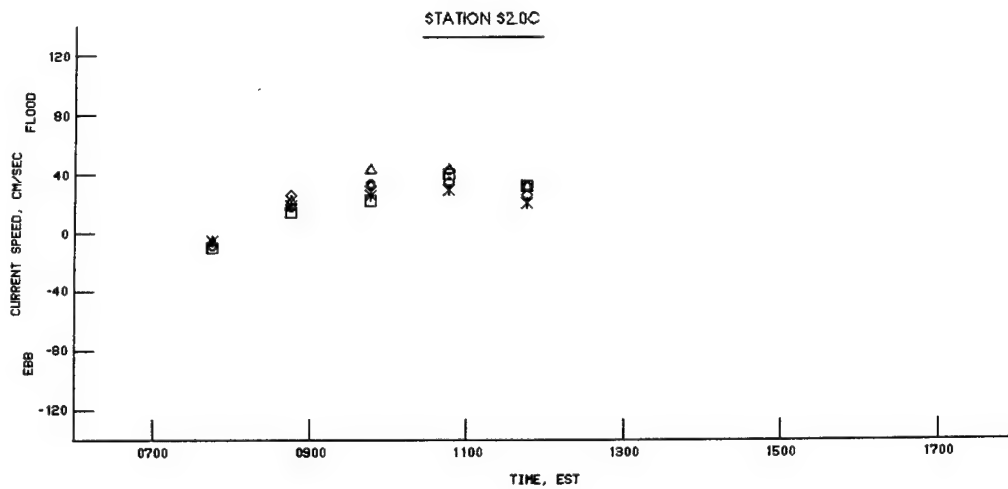
**CURRENT SPEED
STATIONS S2.0C AND S2.0D
10/14/92**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- ✕ - BOTTOM

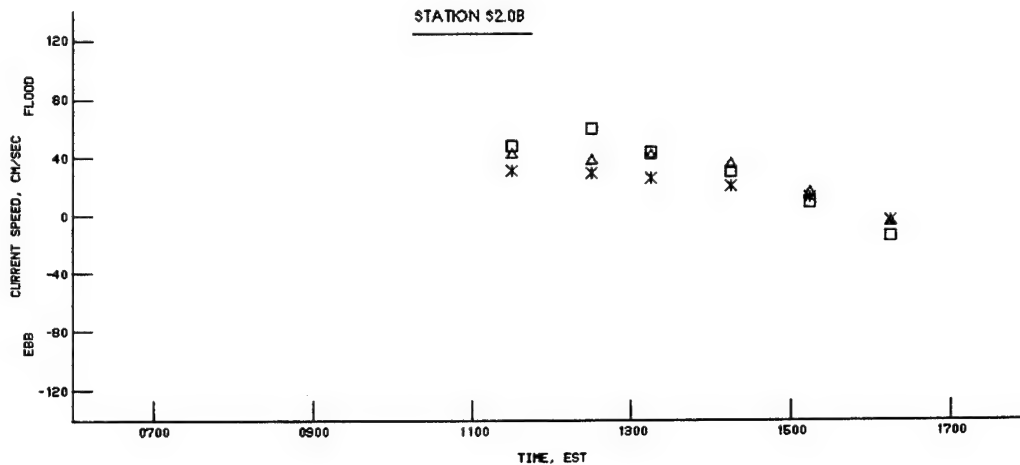
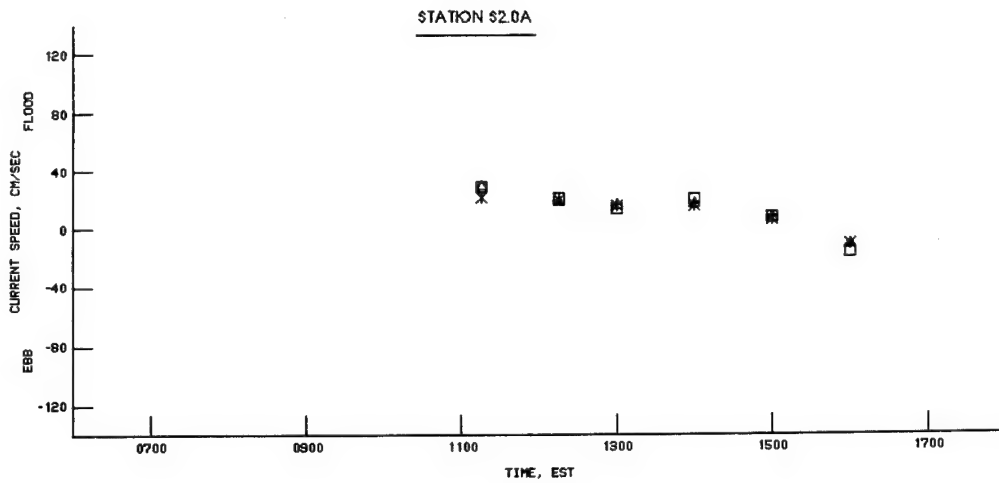
**CURRENT SPEED
STATIONS S2.0A AND S2.0B
10/16/92**



LEGEND

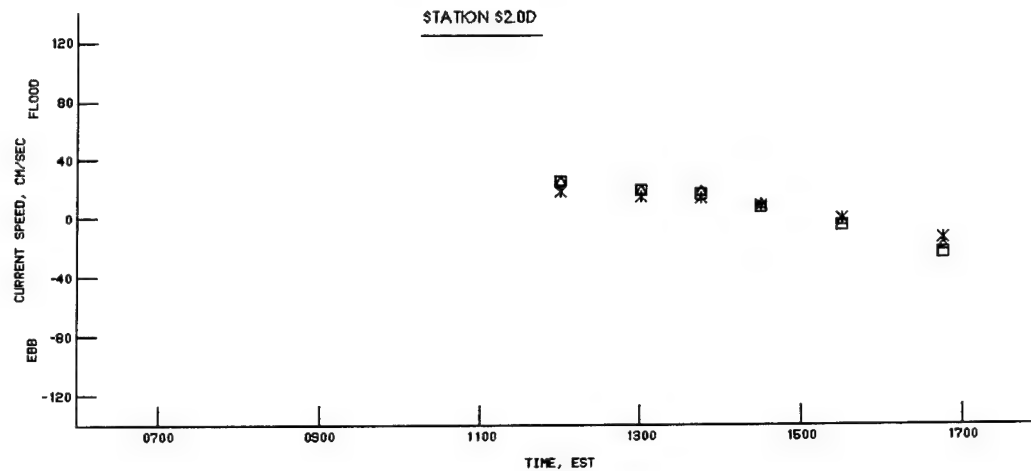
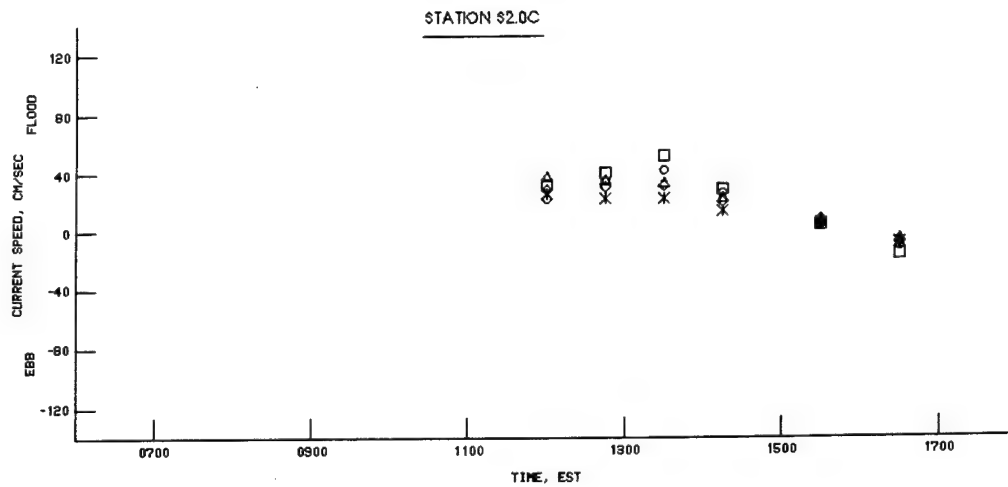
- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- ✱ - BOTTOM

**CURRENT SPEED
STATIONS S2.0C AND S2.0D
10/16/92**



- LEGEND**
- - SURFACE
 - - ONE-QUARTER DEPTH
 - △ - MIDDEPTH
 - ◇ - THREE-QUARTER DEPTH
 - ✱ - BOTTOM

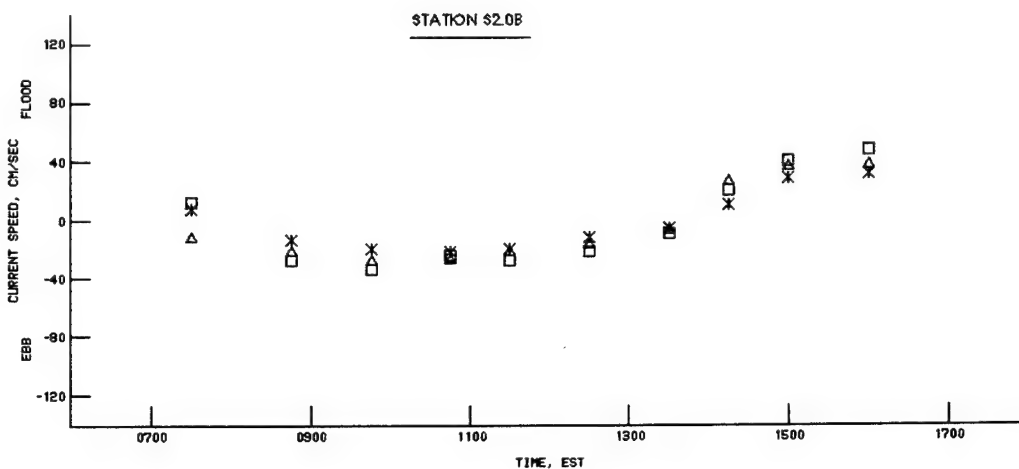
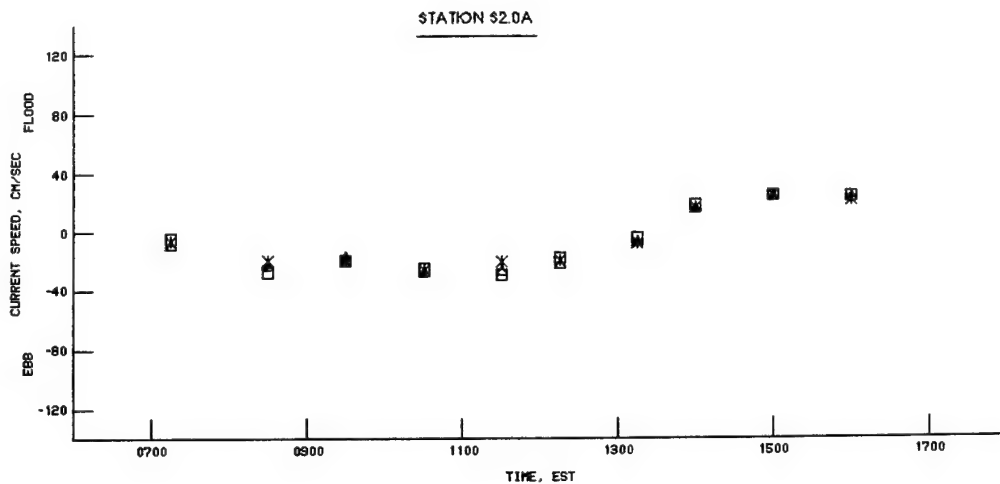
**CURRENT SPEED
STATIONS S2.0A AND S2.0B
10/18/92**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- ✱ - BOTTOM

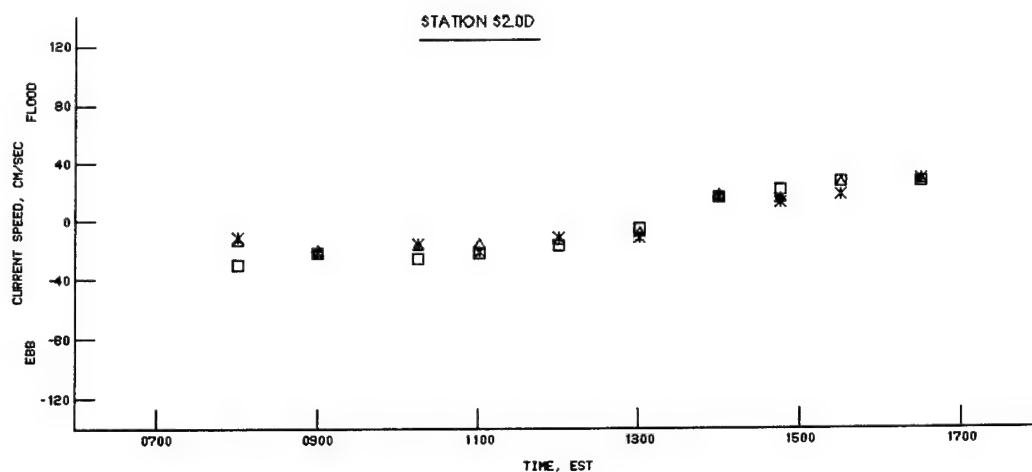
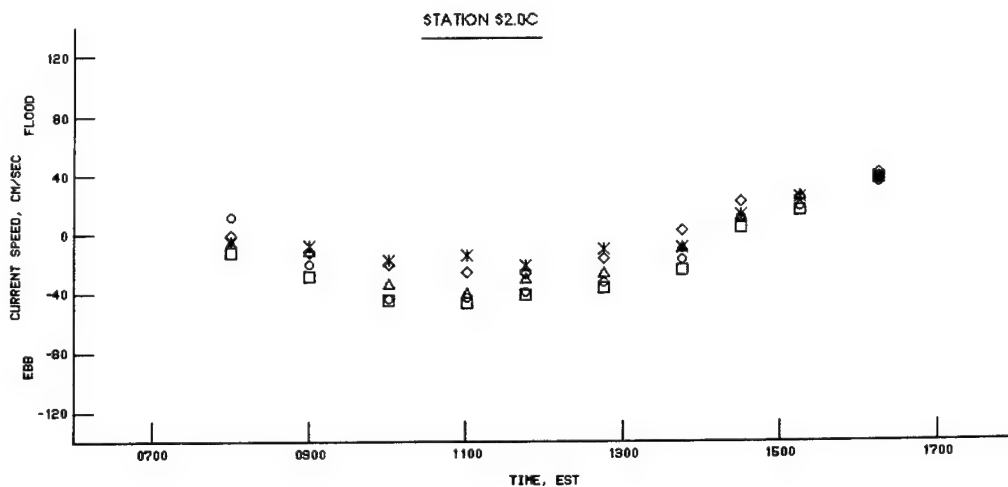
**CURRENT SPEED
STATIONS S2.0C AND S2.0D
10/18/92**



LEGEND

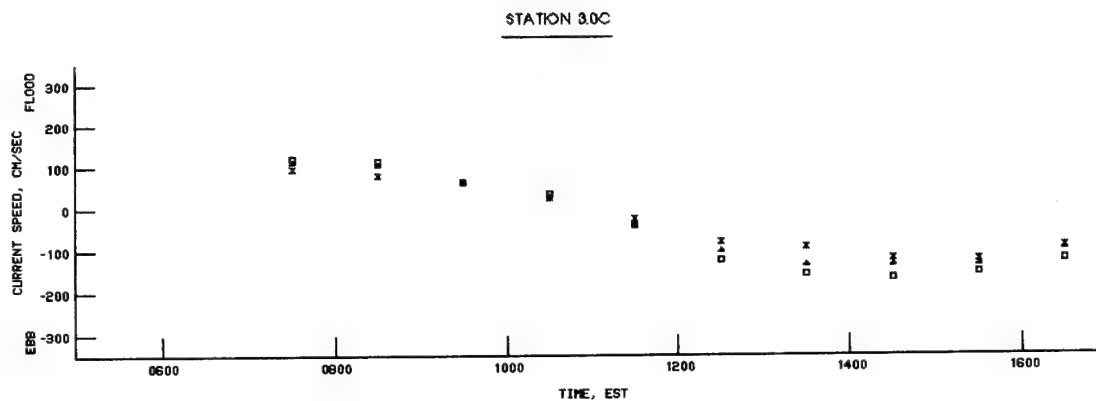
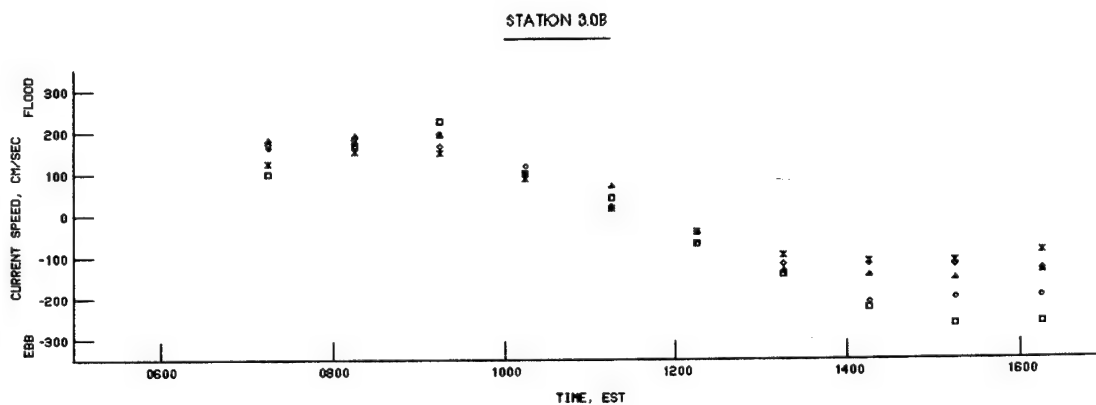
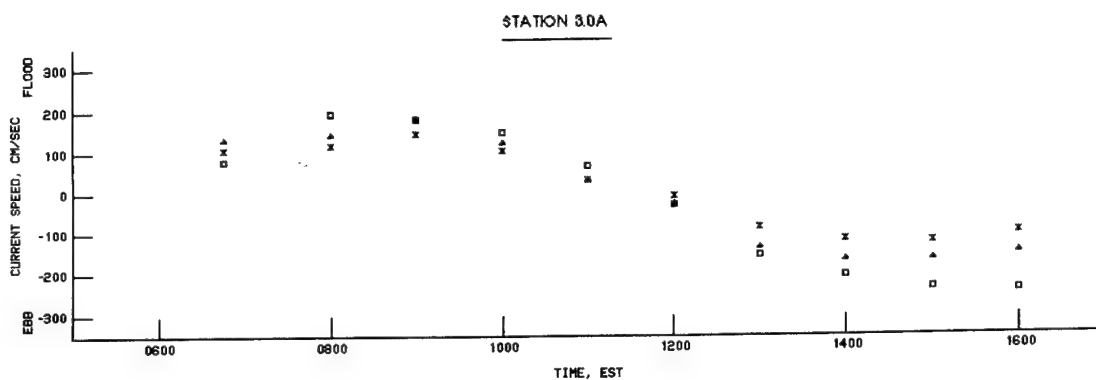
| | |
|---|-----------------------|
| □ | - SURFACE |
| ○ | - ONE-QUARTER DEPTH |
| △ | - MIDDEPTH |
| ◇ | - THREE-QUARTER DEPTH |
| × | - BOTTOM |

**CURRENT SPEED
STATIONS S2.0A AND S2.0B
10/22/92**



- LEGEND**
- - SURFACE
 - - ONE-QUARTER DEPTH
 - △ - MIDDEPTH
 - ◇ - THREE-QUARTER DEPTH
 - * - BOTTOM

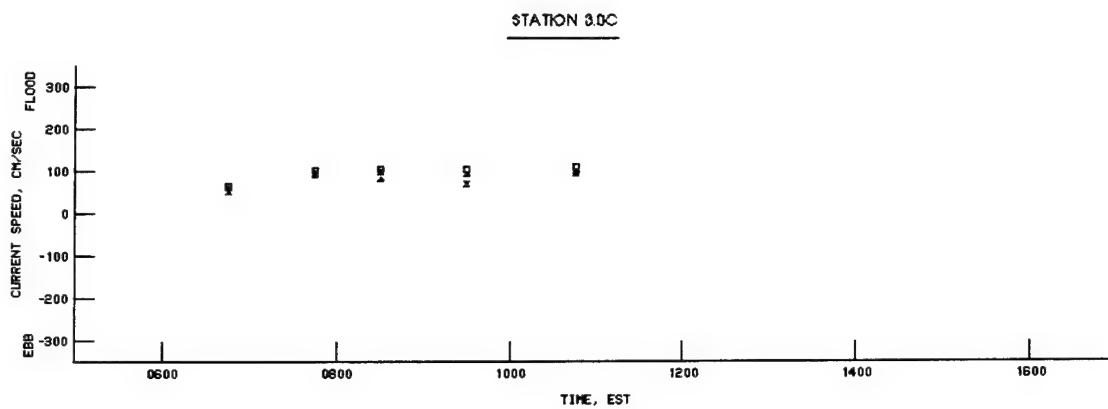
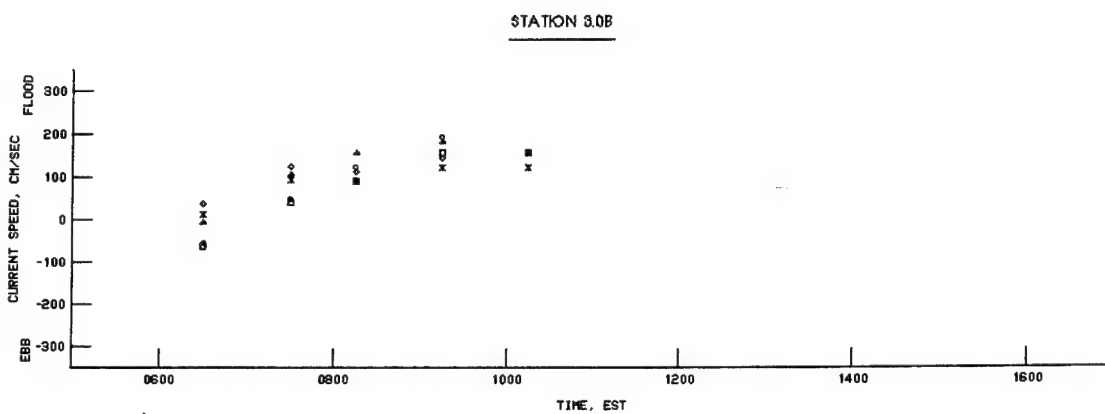
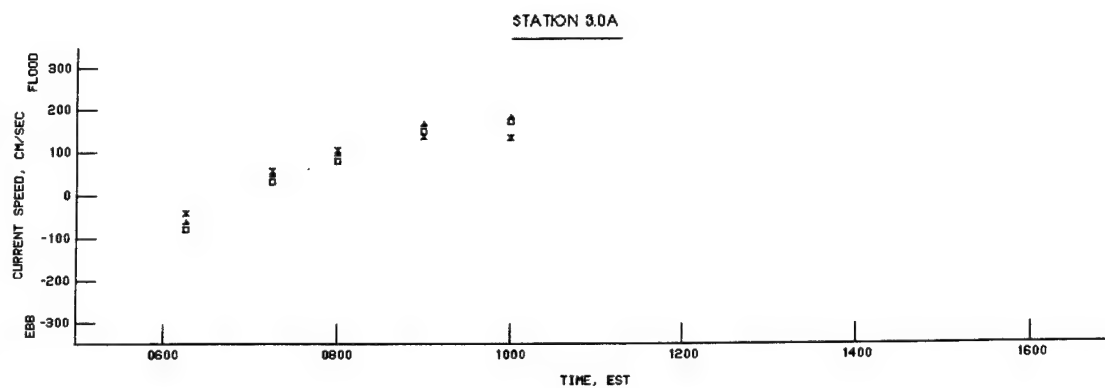
**CURRENT SPEED
STATIONS S2.0C AND S2.0D
10/22/92**



LEGEND

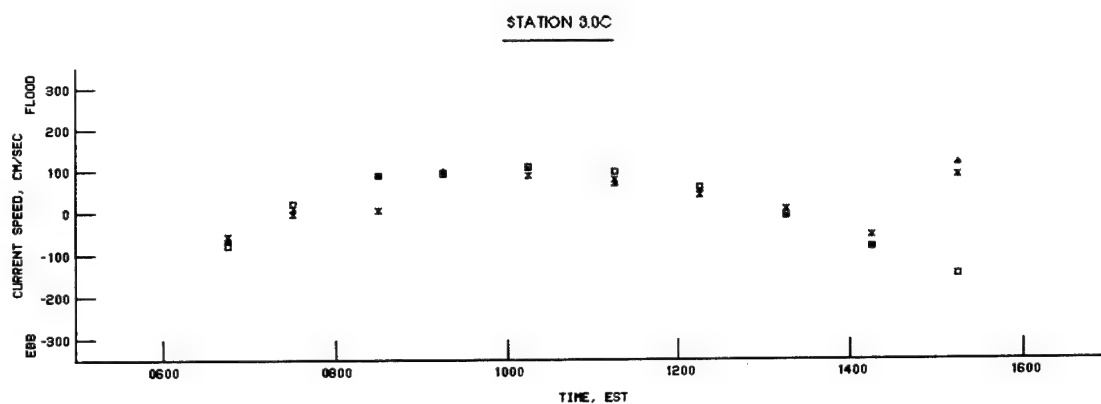
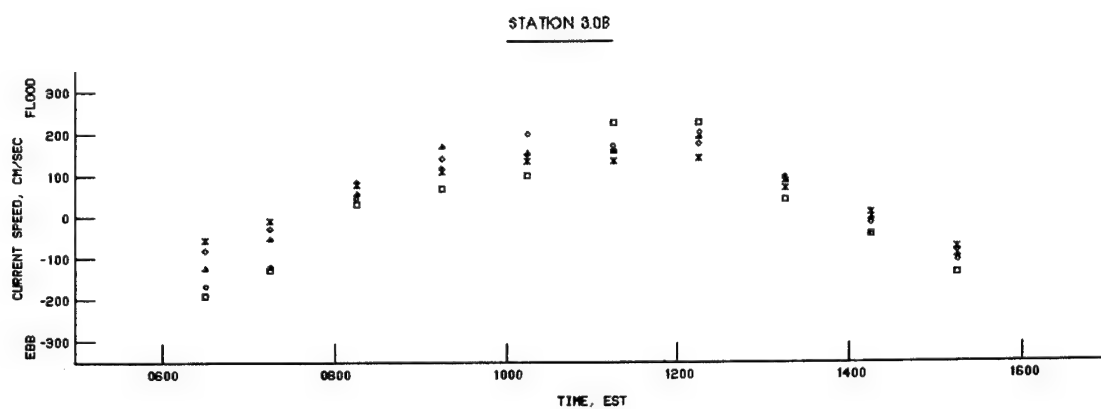
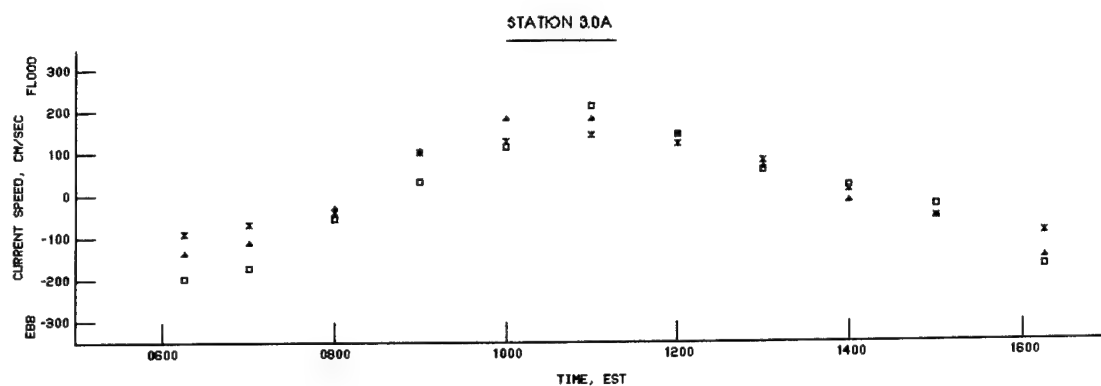
- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- × - BOTTOM

**CURRENT SPEED
STATIONS S3.0A, S3.0B, AND S3.0C
10/11/92**



- LEGEND
- - SURFACE
 - - ONE-QUARTER DEPTH
 - △ - MIDDEPTH
 - ◇ - THREE-QUARTER DEPTH
 - × - BOTTOM

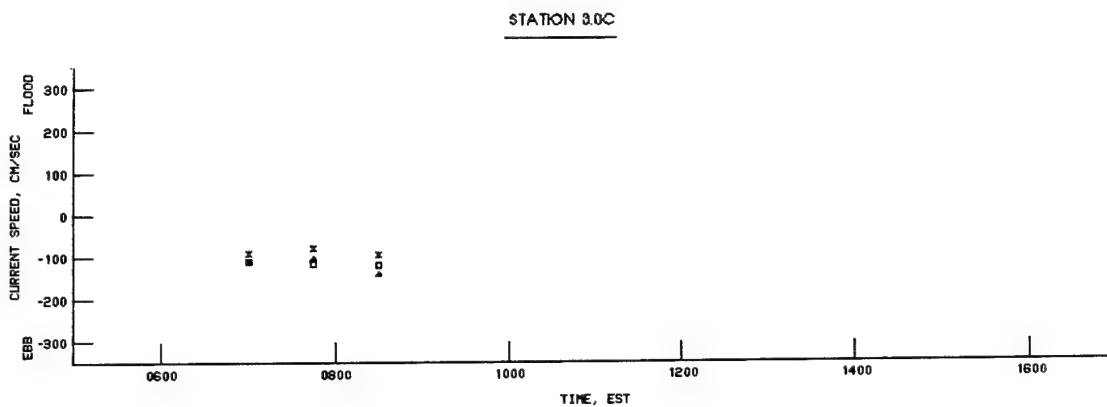
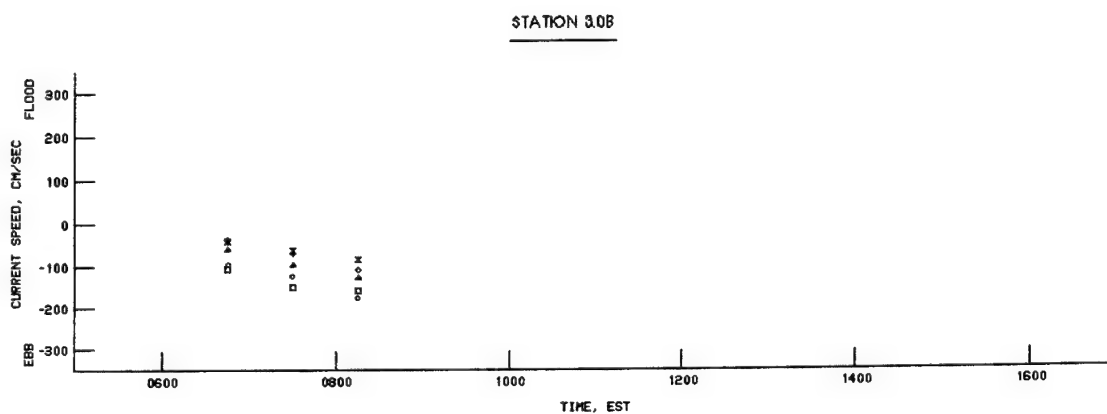
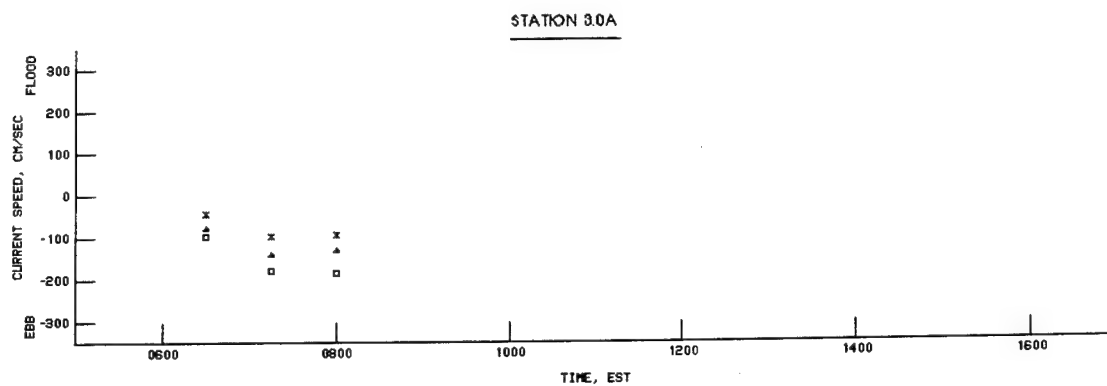
CURRENT SPEED
STATIONS S3.0A, S3.0B, AND S3.0C
10/13/92



LEGEND

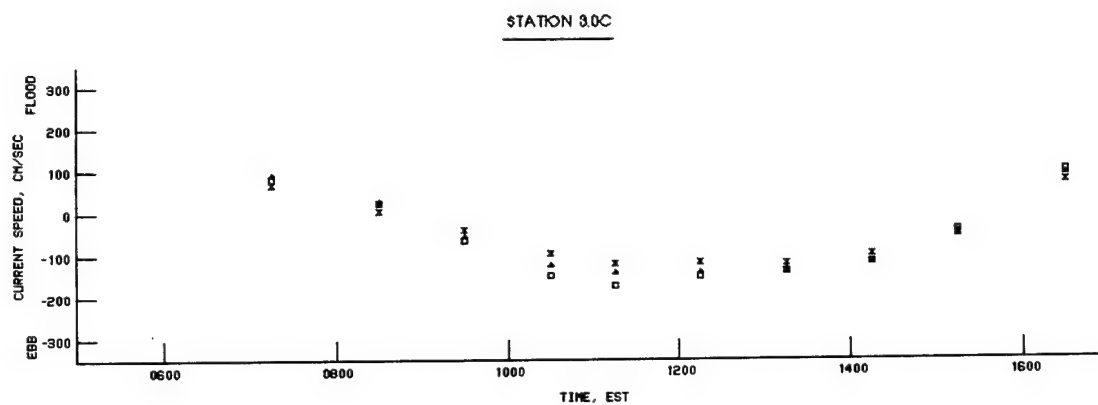
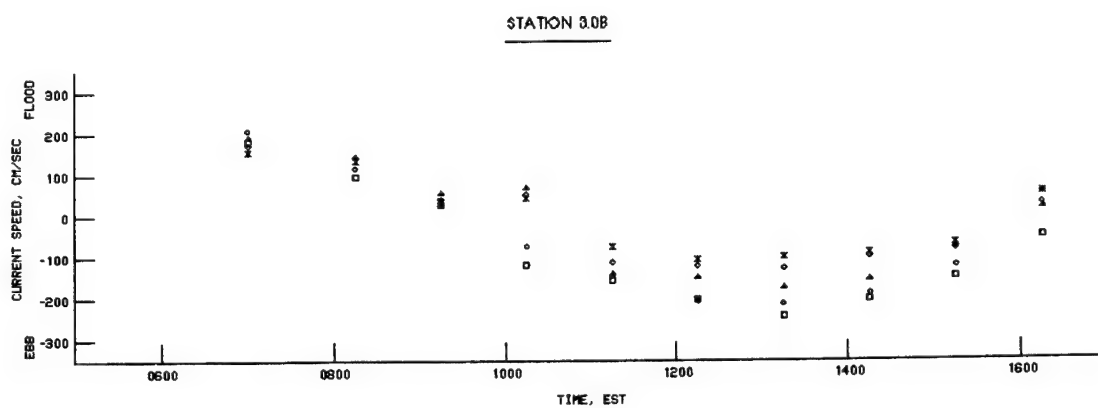
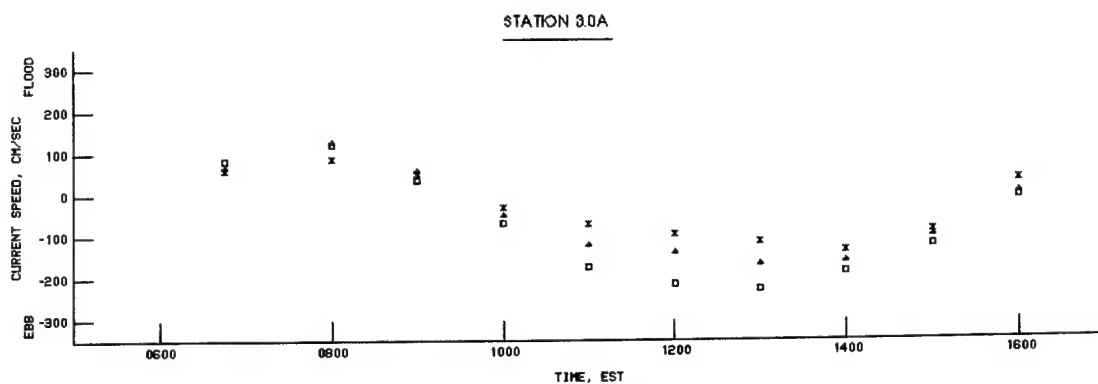
- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- ✕ - BOTTOM

CURRENT SPEED
STATIONS S3.0A, S3.0B, AND S3.0C
10/15/92



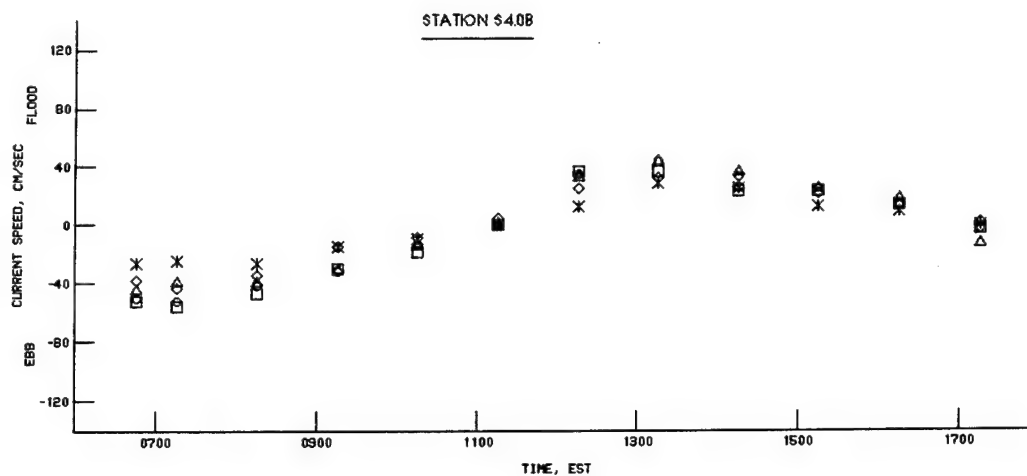
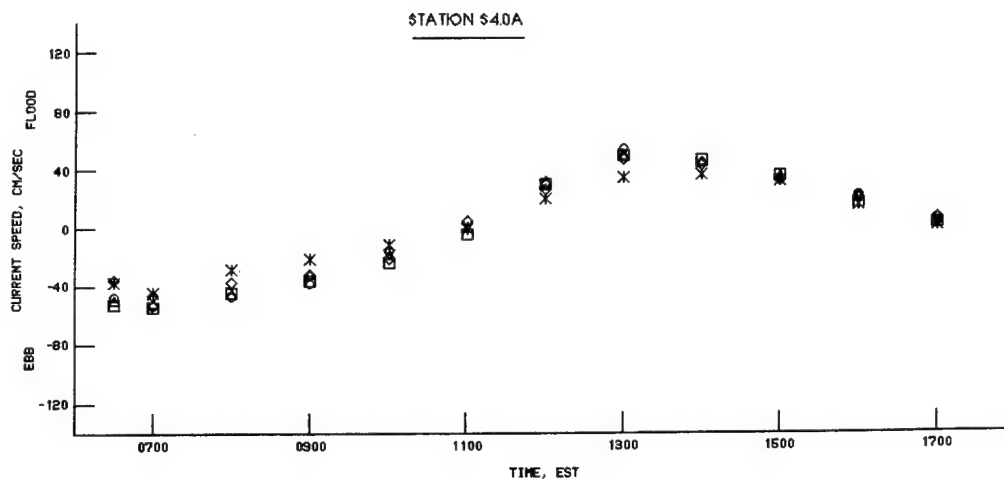
- LEGEND**
- - SURFACE
 - - ONE-QUARTER DEPTH
 - △ - MIDDEPTH
 - ◇ - THREE-QUARTER DEPTH
 - * - BOTTOM

**CURRENT SPEED
STATIONS S3.0A, S3.0B, AND S3.0C
10/19/92**



- LEGEND**
- - SURFACE
 - - ONE-QUARTER DEPTH
 - △ - MIDDEPTH
 - ◇ - THREE-QUARTER DEPTH
 - ✱ - BOTTOM

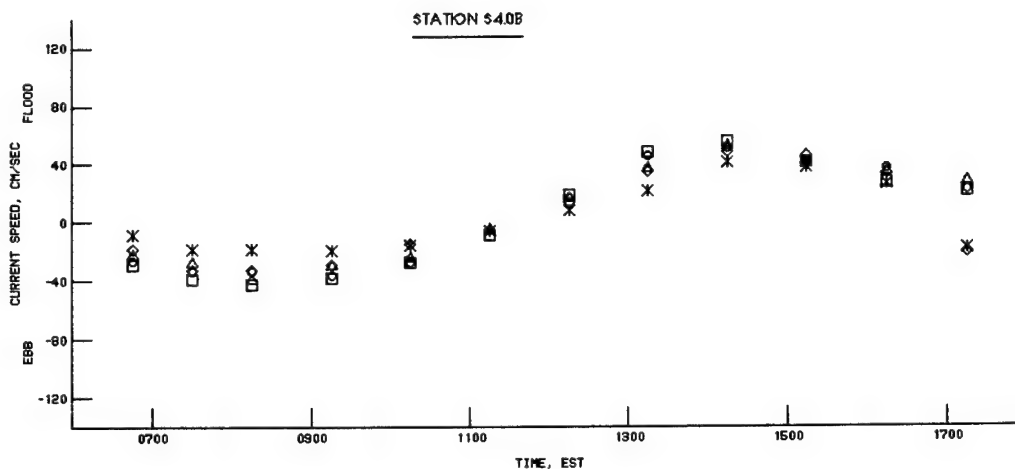
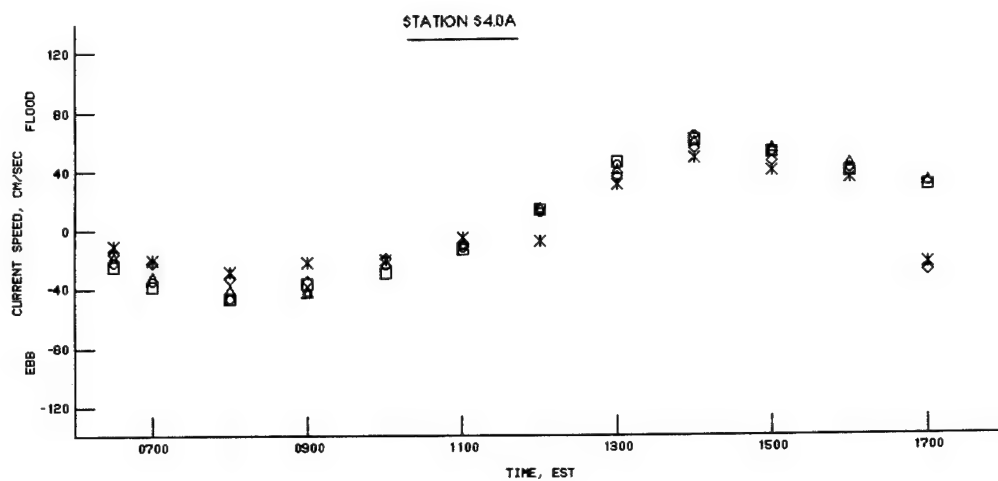
**CURRENT SPEED
STATIONS S3.0A, S3.0B, AND S3.0C
10/23/92**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- ✕ - BOTTOM

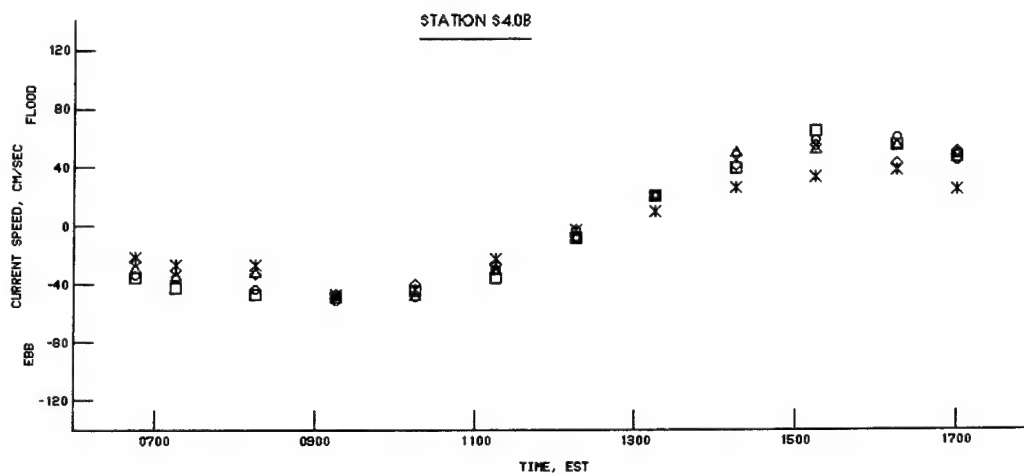
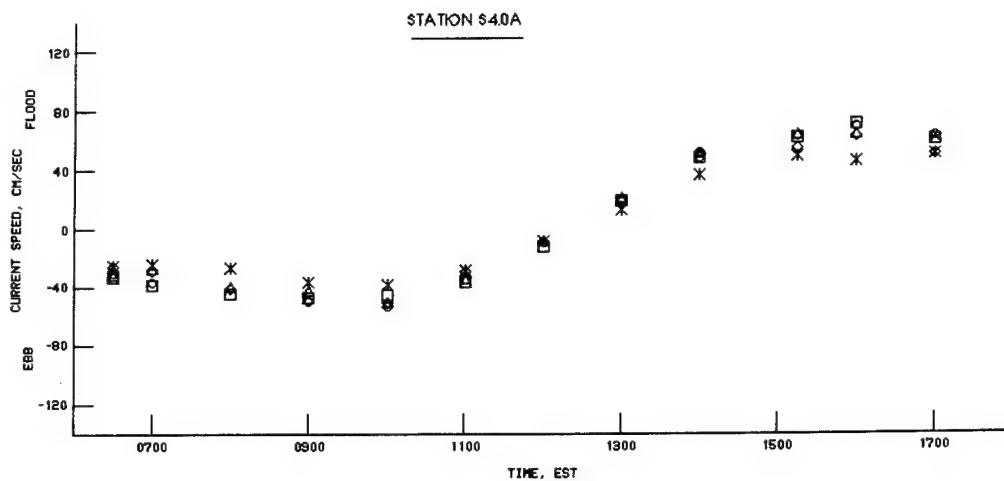
**CURRENT SPEED
STATIONS S4.0A AND S4.0B
10/13/92**



LEGEND

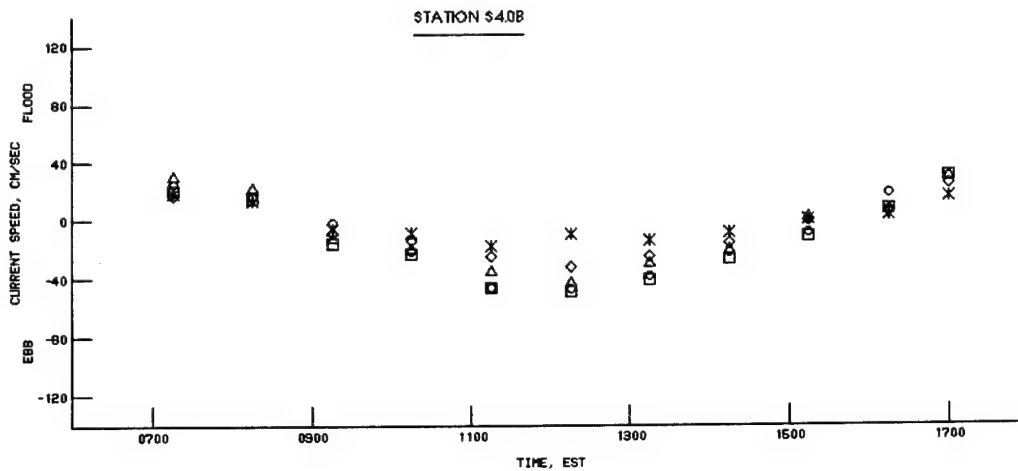
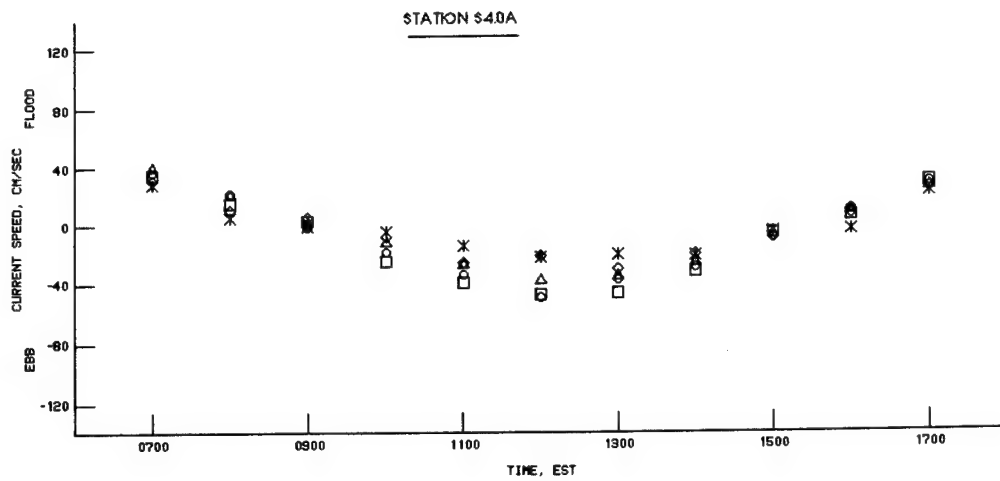
- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- ✕ - BOTTOM

**CURRENT SPEED
STATIONS S4.0A AND S4.0B
10/15/92**



- LEGEND**
- - SURFACE
 - - ONE-QUARTER DEPTH
 - △ - MIDDEPTH
 - ◇ - THREE-QUARTER DEPTH
 - ✱ - BOTTOM

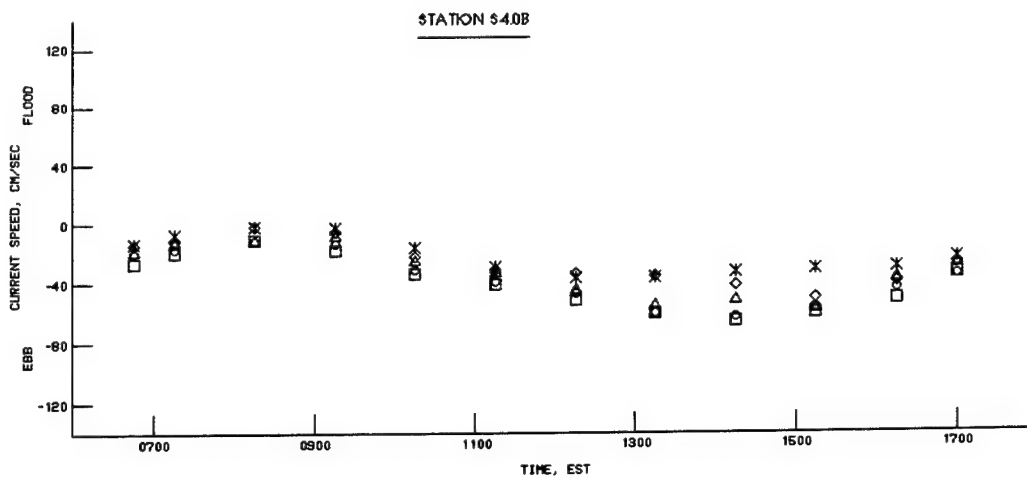
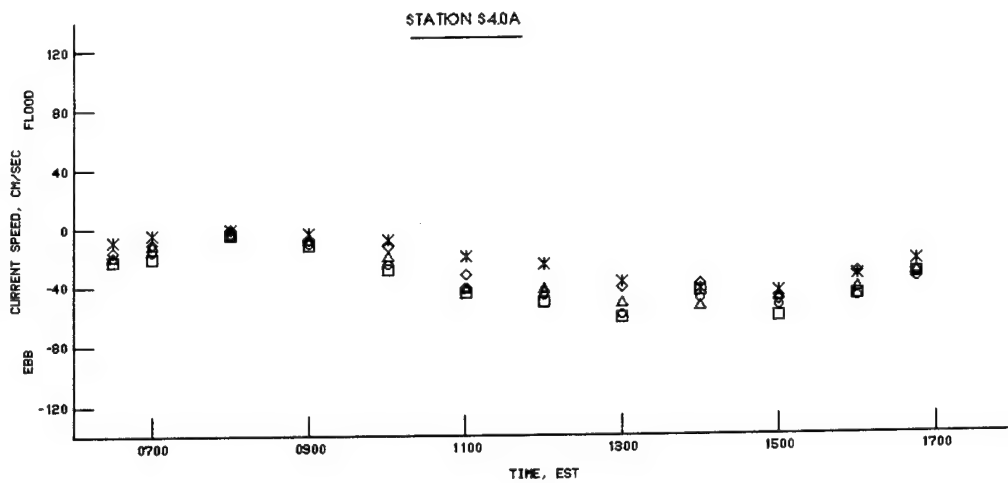
**CURRENT SPEED
STATIONS S4.0A AND S4.0B
10/17/92**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- * - BOTTOM

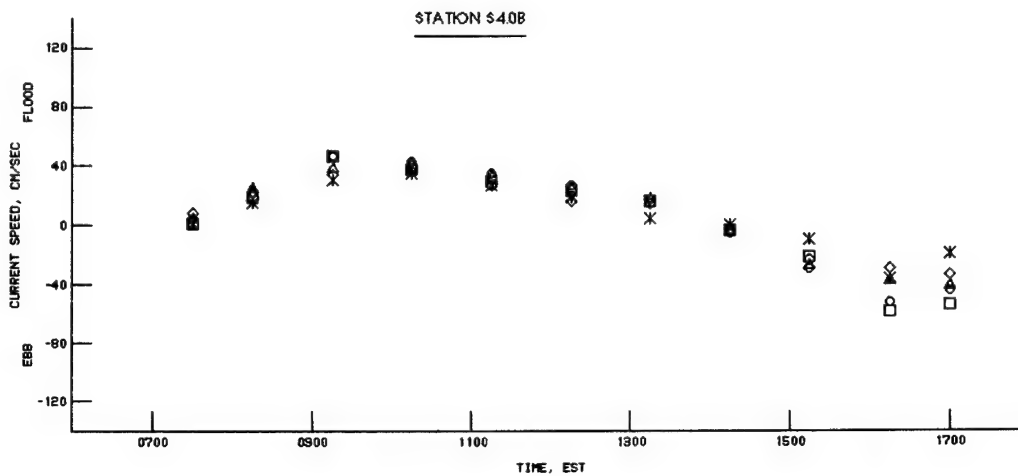
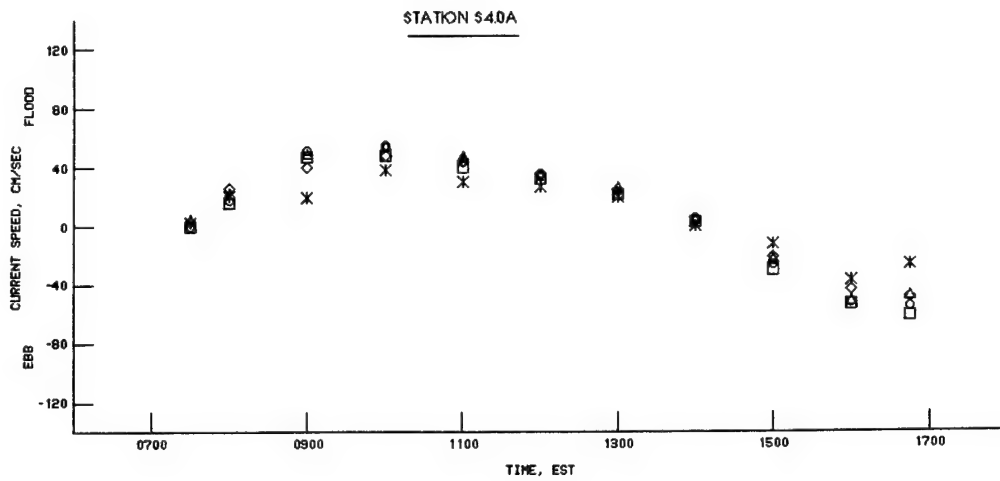
**CURRENT SPEED
STATIONS S4.0A AND S4.0B
10/19/92**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- ✱ - BOTTOM

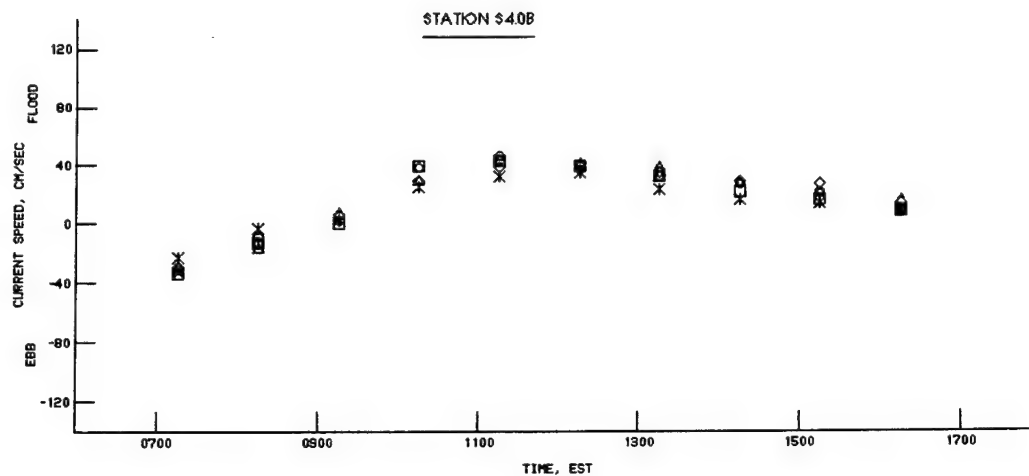
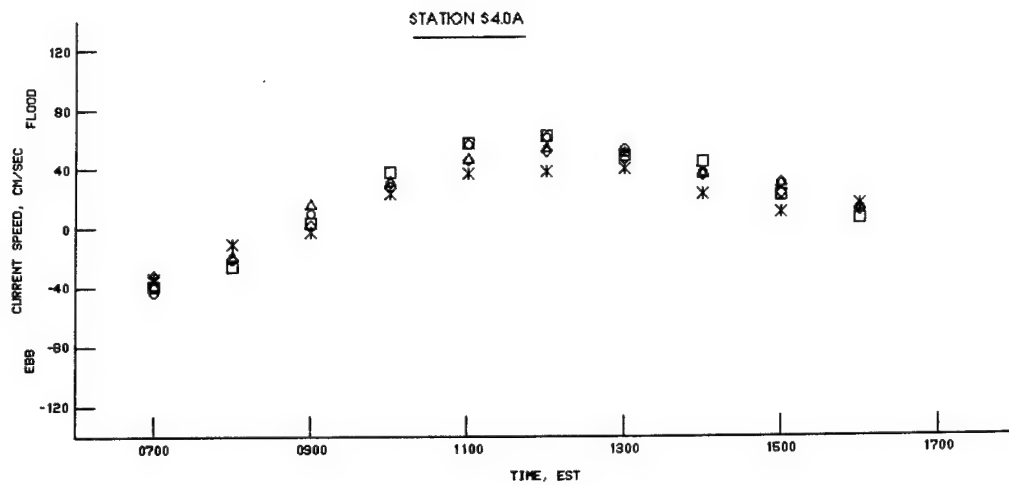
**CURRENT SPEED
STATIONS S4.0A AND S4.0B
10/21/92**



LEGEND

| | |
|---|-----------------------|
| □ | - SURFACE |
| ○ | - ONE-QUARTER DEPTH |
| △ | - MIDDEPTH |
| ◇ | - THREE-QUARTER DEPTH |
| × | - BOTTOM |

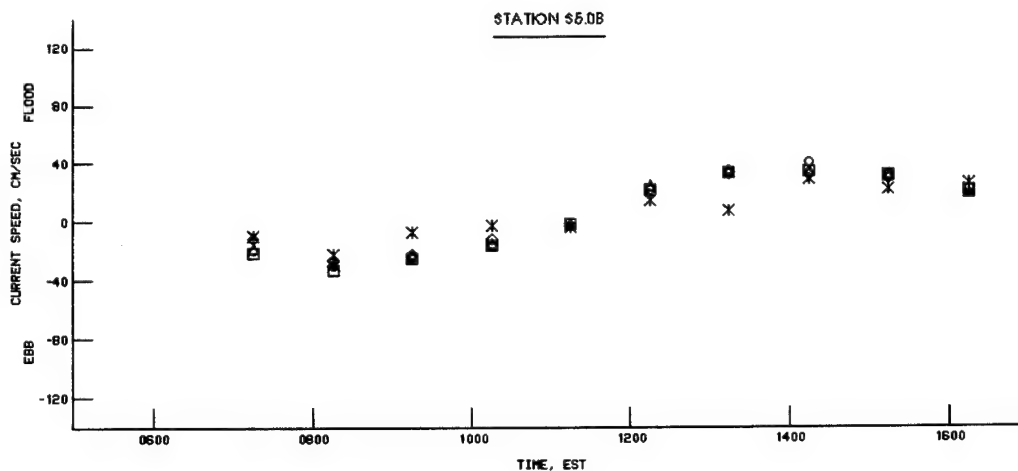
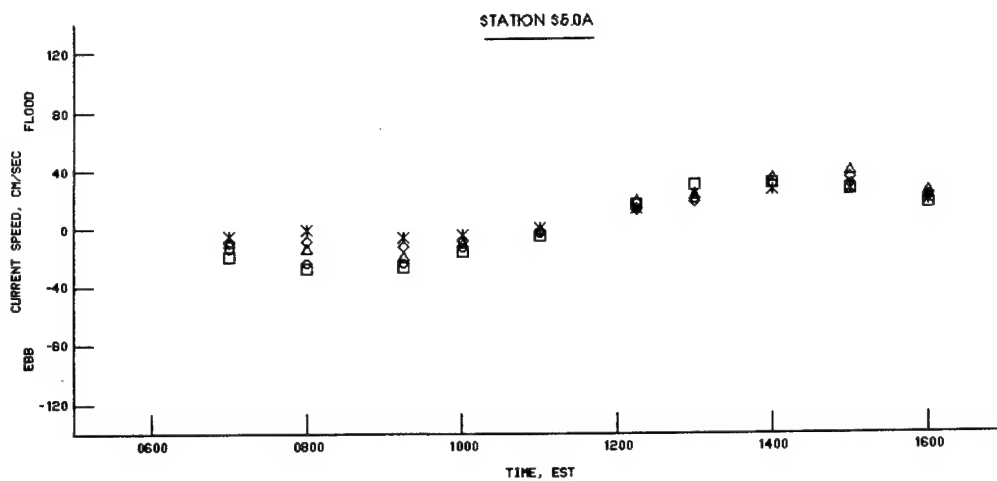
**CURRENT SPEED
STATIONS S4.0A AND S4.0B
10/23/92**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- * - BOTTOM

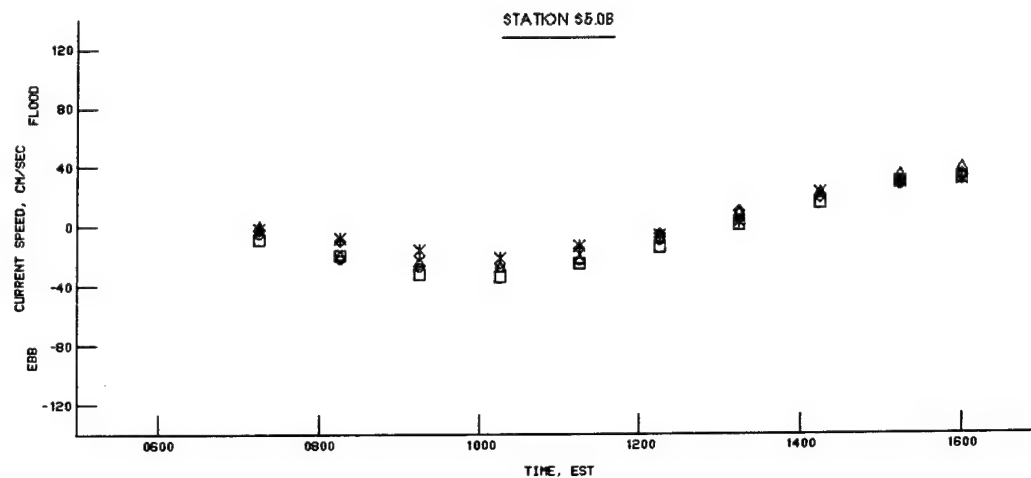
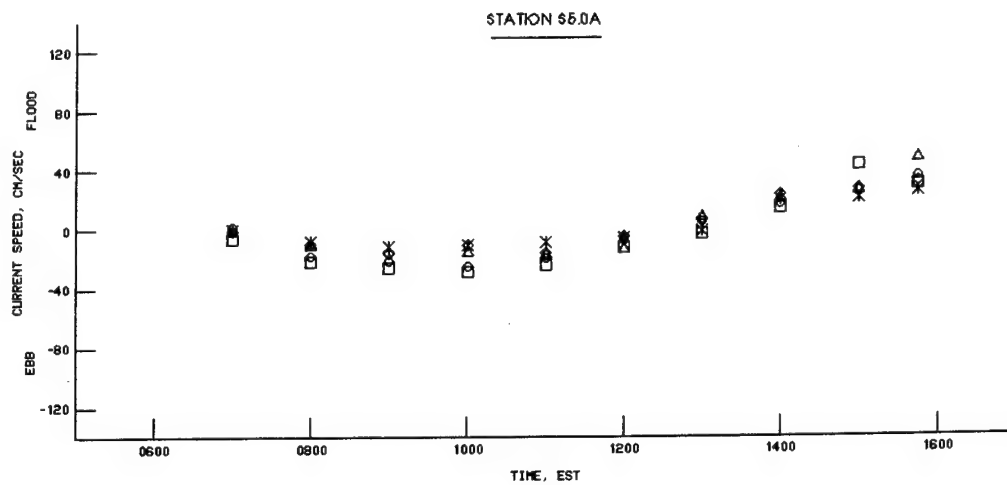
**CURRENT SPEED
STATIONS S4.0A AND S4.0B
10/25/92**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- ✱ - BOTTOM

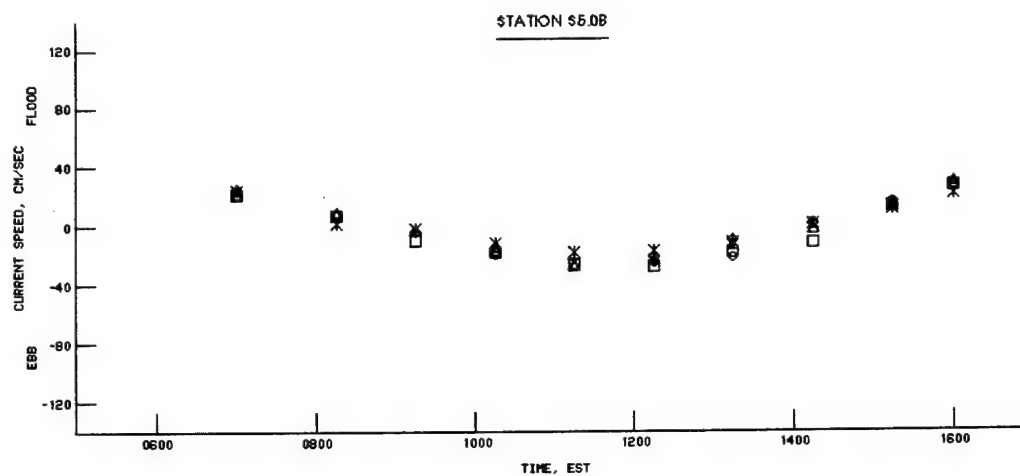
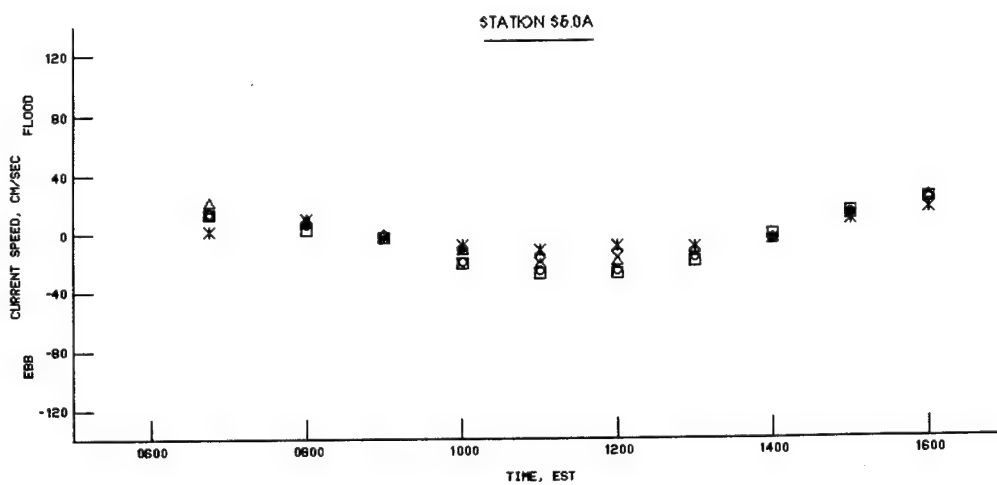
**CURRENT SPEED
STATIONS S5.0A AND S5.0B
10/14/92**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- * - BOTTOM

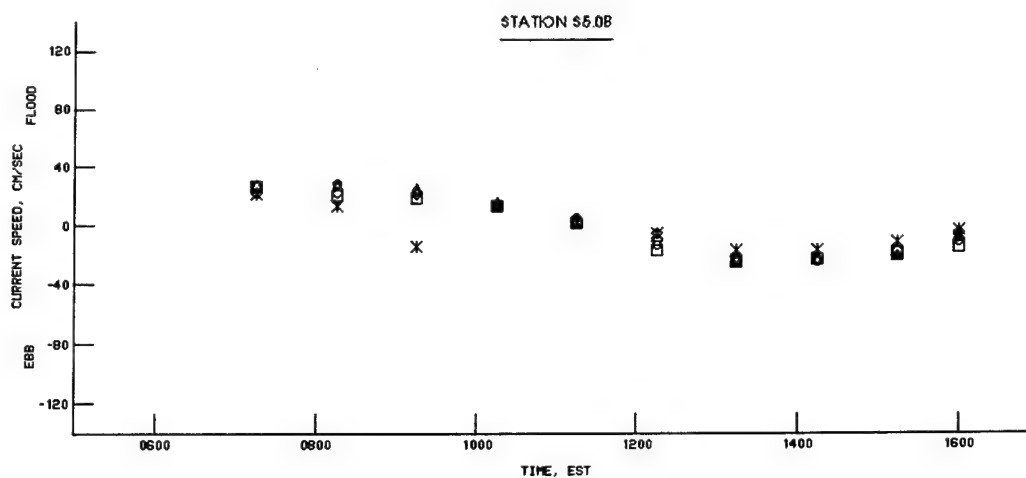
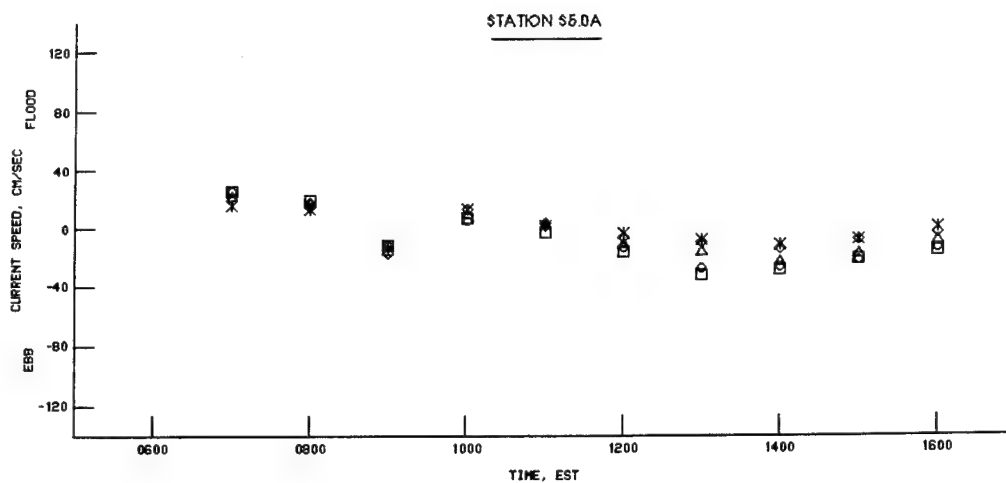
**CURRENT SPEED
STATIONS S5.0A AND S5.0B
10/16/92**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- × - BOTTOM

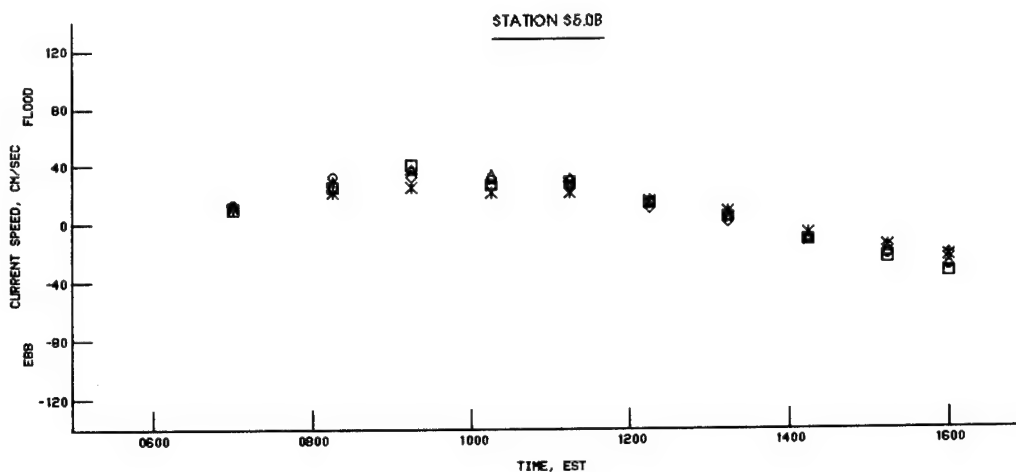
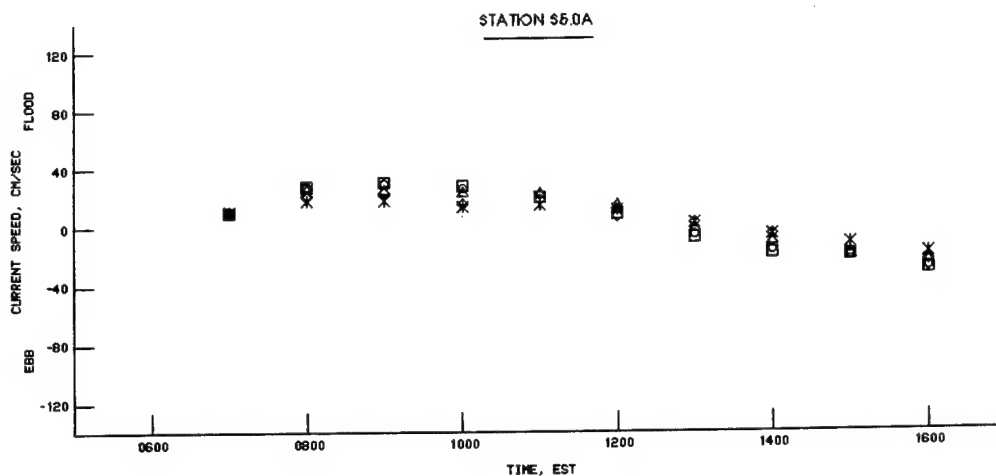
**CURRENT SPEED
STATIONS S5.0A AND S5.0B
10/18/92**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- × - BOTTOM

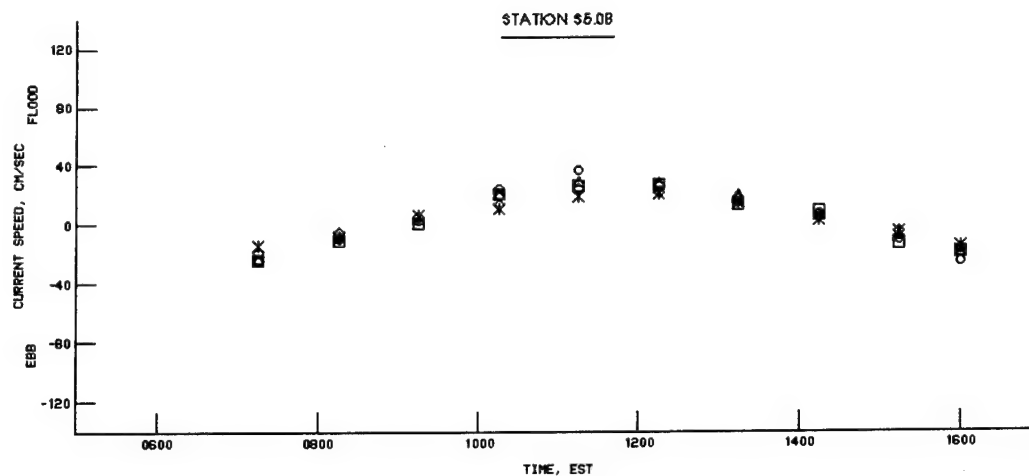
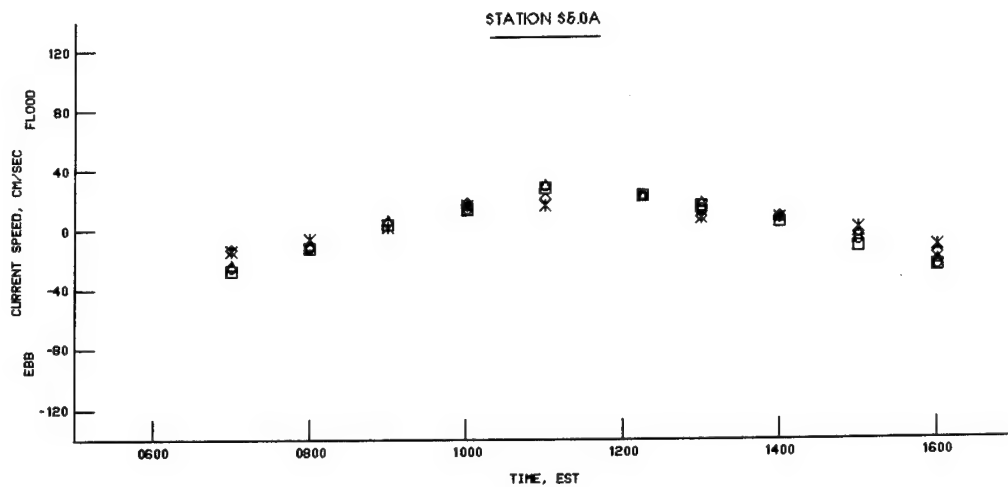
**CURRENT SPEED
STATIONS S5.0A AND S5.0B
10/20/92**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- × - BOTTOM

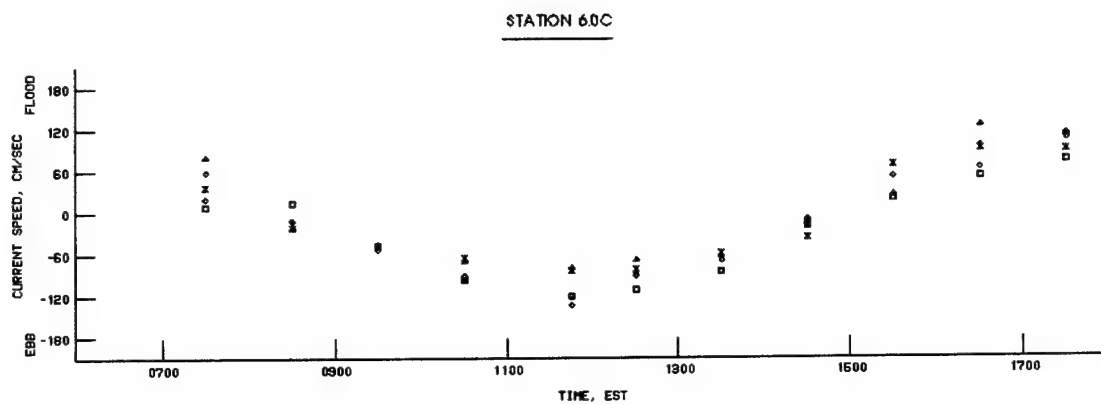
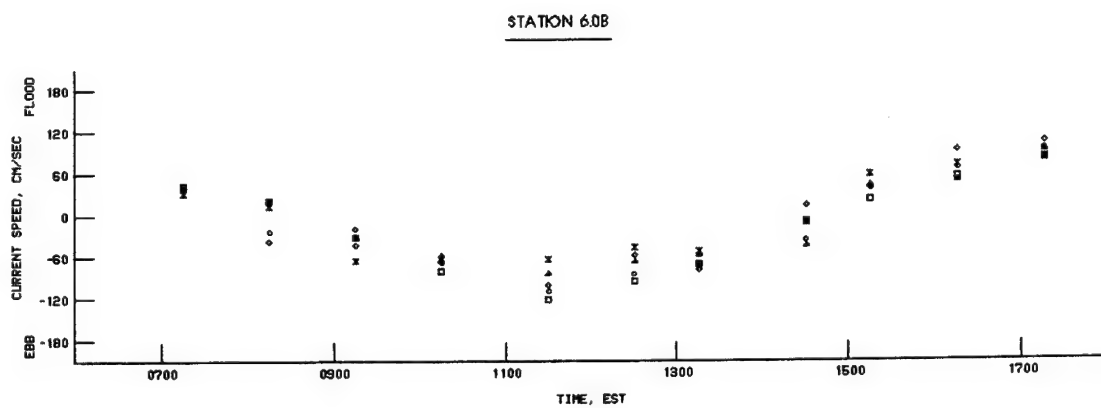
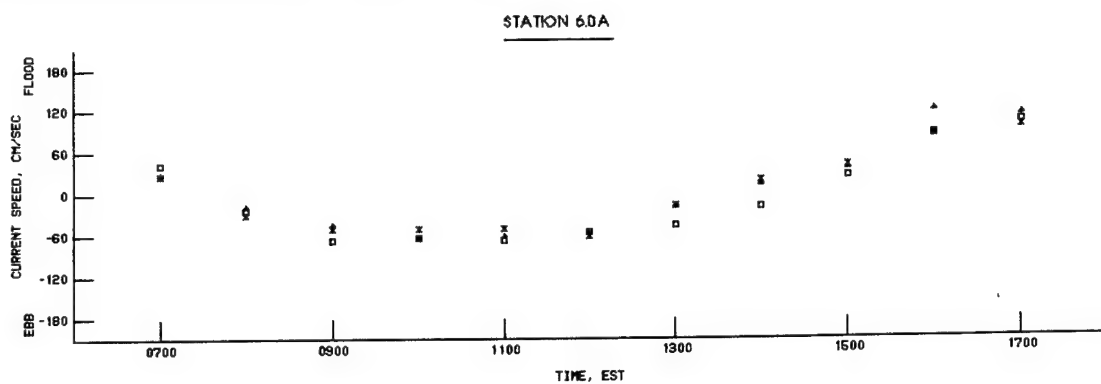
**CURRENT SPEED
STATIONS S5.0A AND S5.0B
10/22/92**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- × - BOTTOM

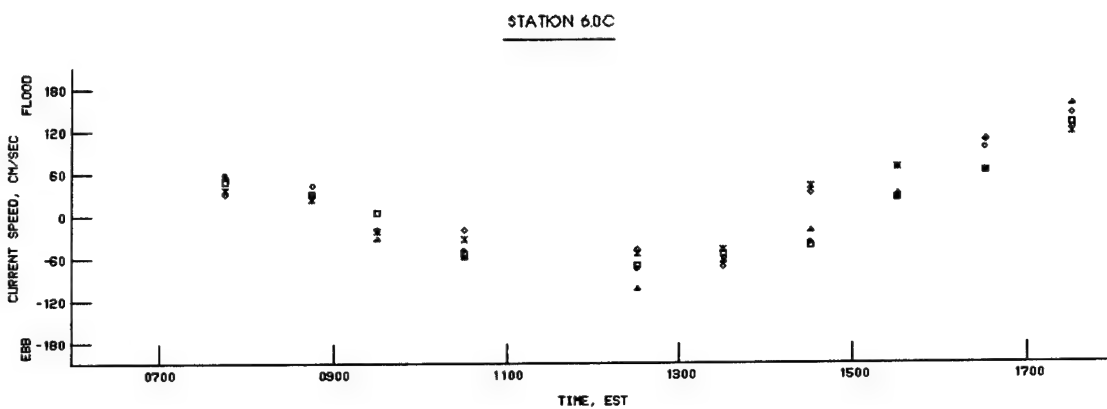
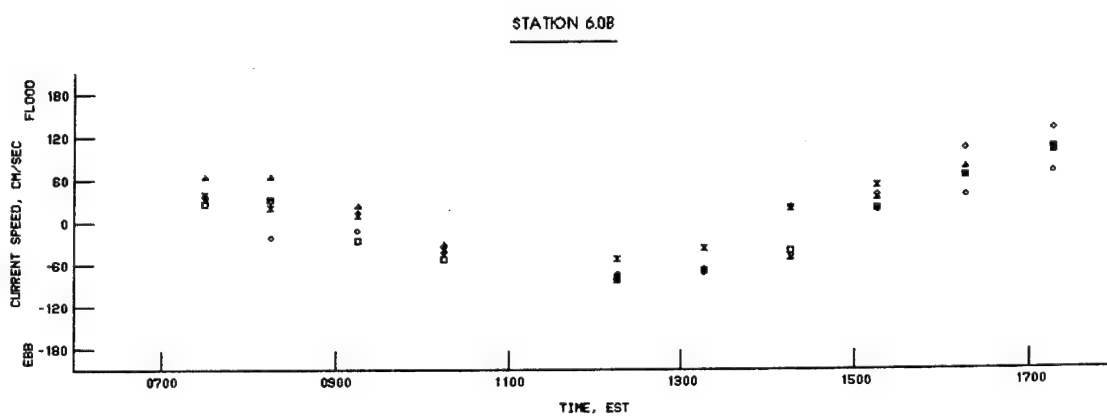
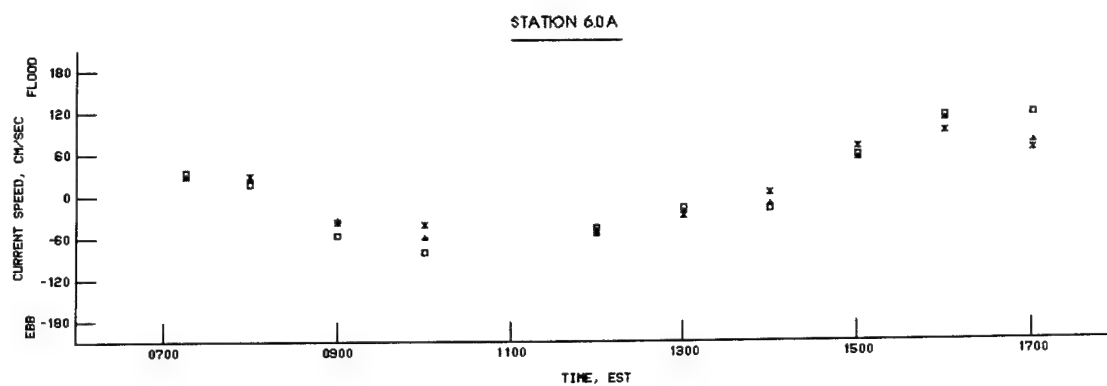
**CURRENT SPEED
STATIONS S5.0A AND S5.0B
10/24/92**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- × - BOTTOM

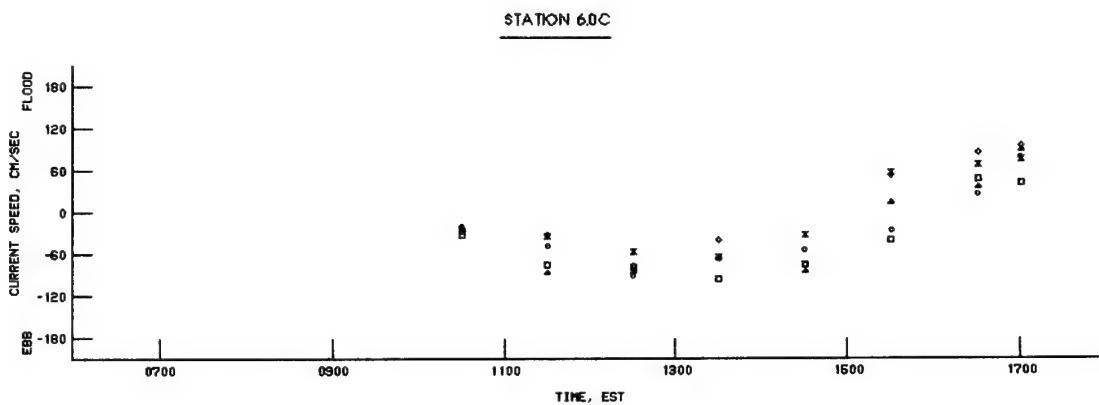
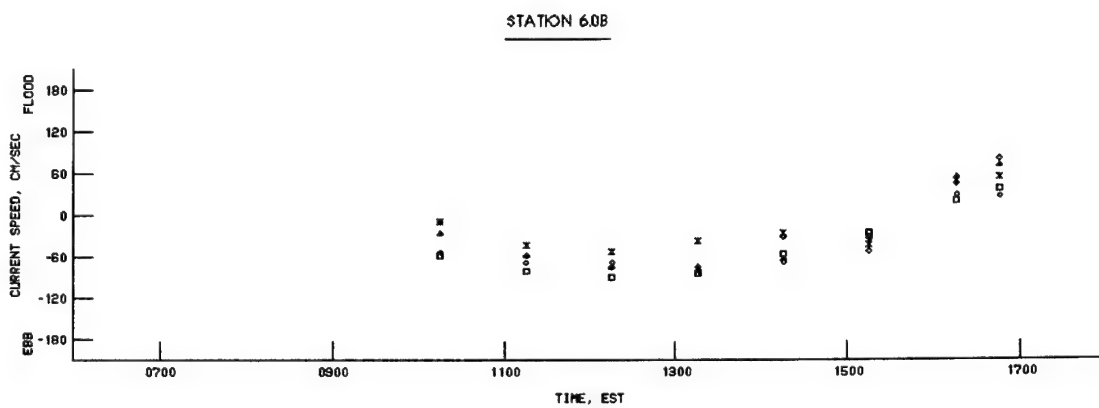
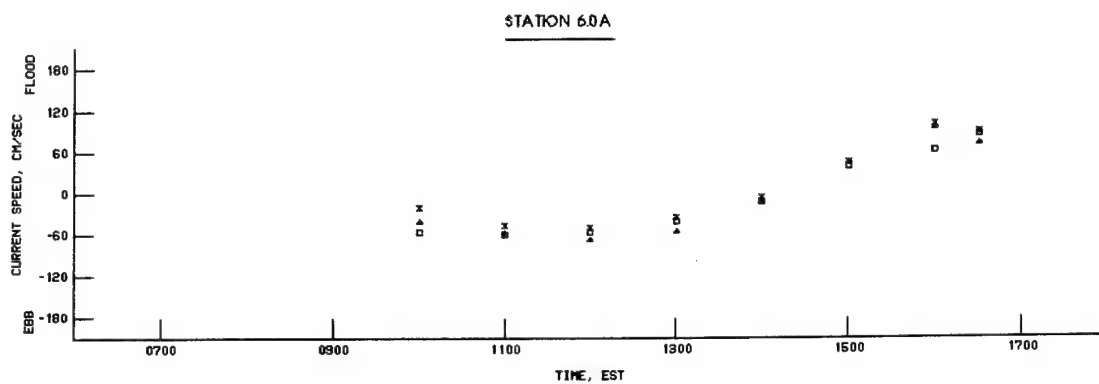
**CURRENT SPEED
STATIONS S6.0A, S6.0B, AND S6.0C
10/13/92**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- × - BOTTOM

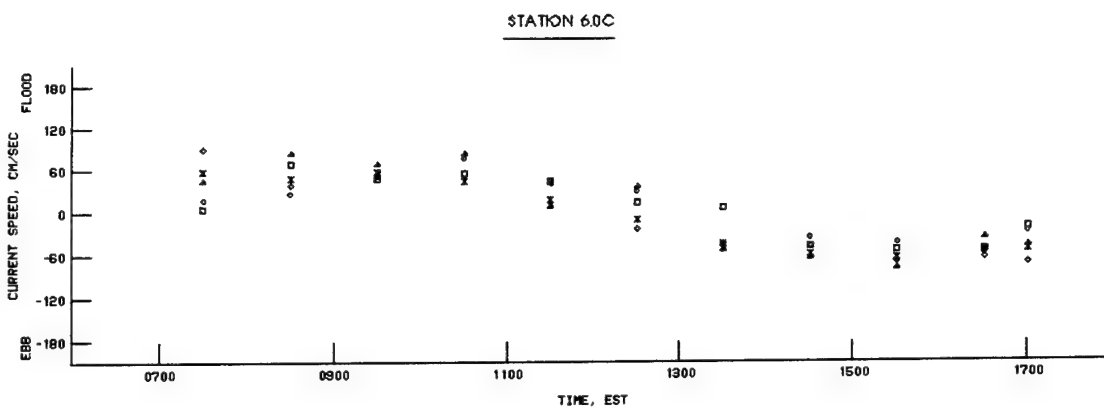
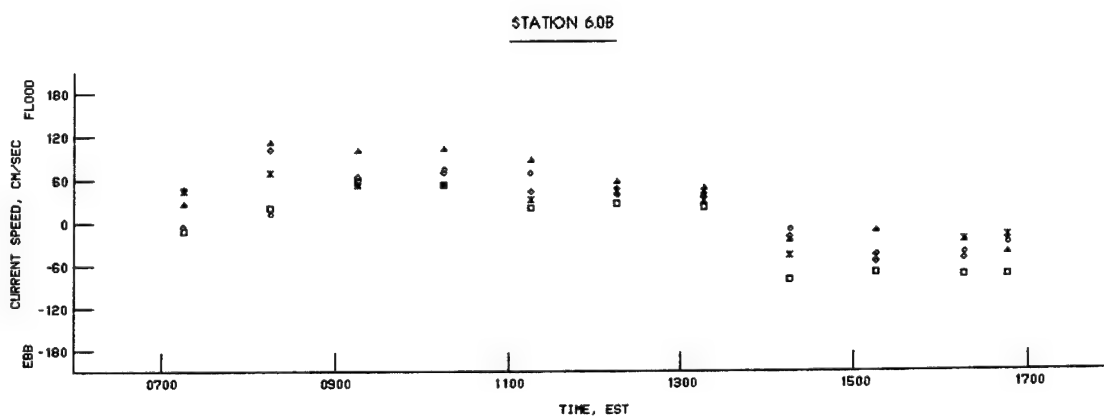
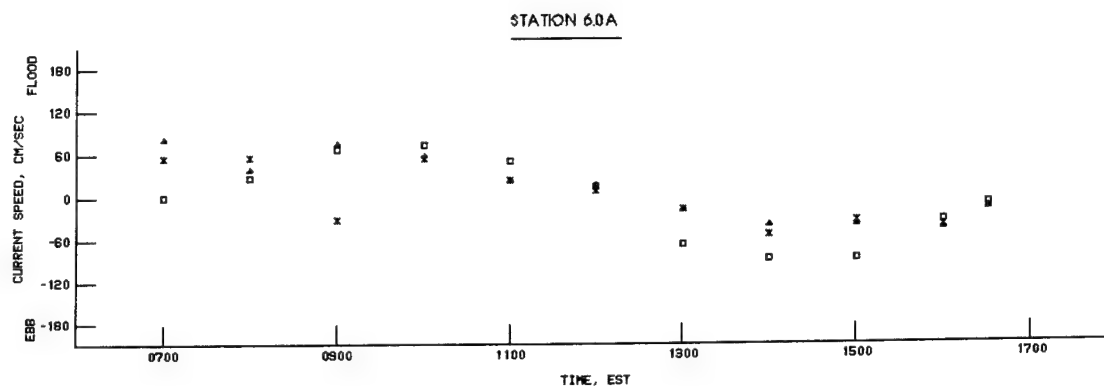
CURRENT SPEED
STATIONS S6.0A, S6.0B, AND S6.0C
10/14/92



LEGEND

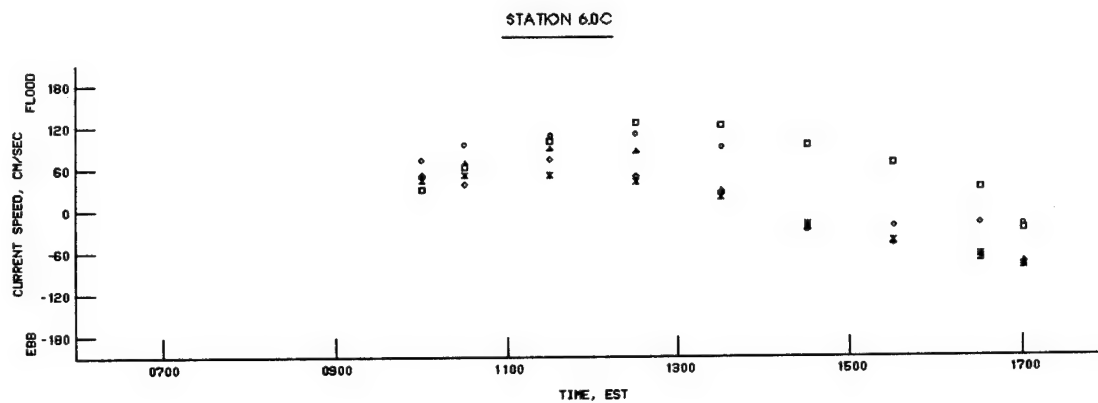
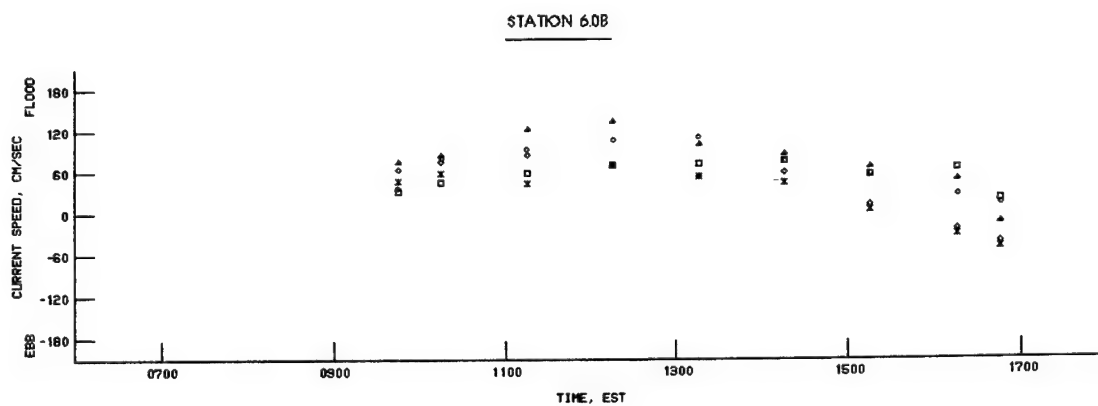
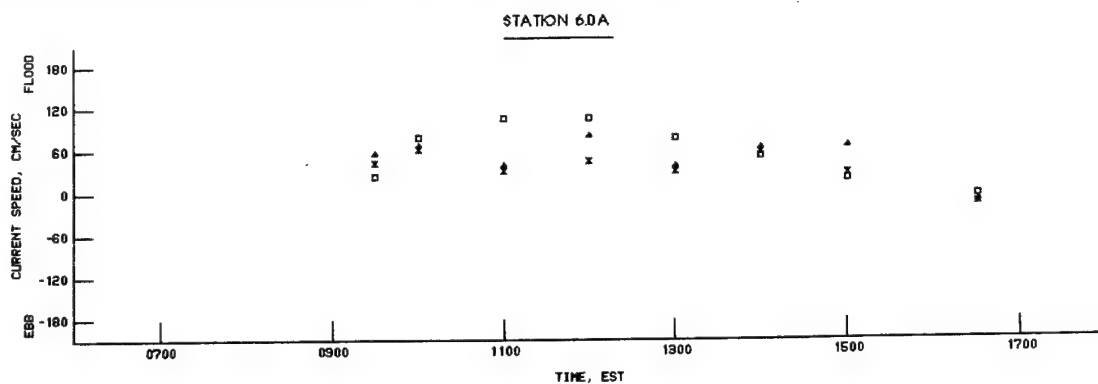
- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- ✱ - BOTTOM

CURRENT SPEED
STATIONS S6.0A, S6.0B, AND S6.0C
10/15/92



- LEGEND**
- - SURFACE
 - - ONE-QUARTER DEPTH
 - △ - MIDDEPTH
 - ◇ - THREE-QUARTER DEPTH
 - × - BOTTOM

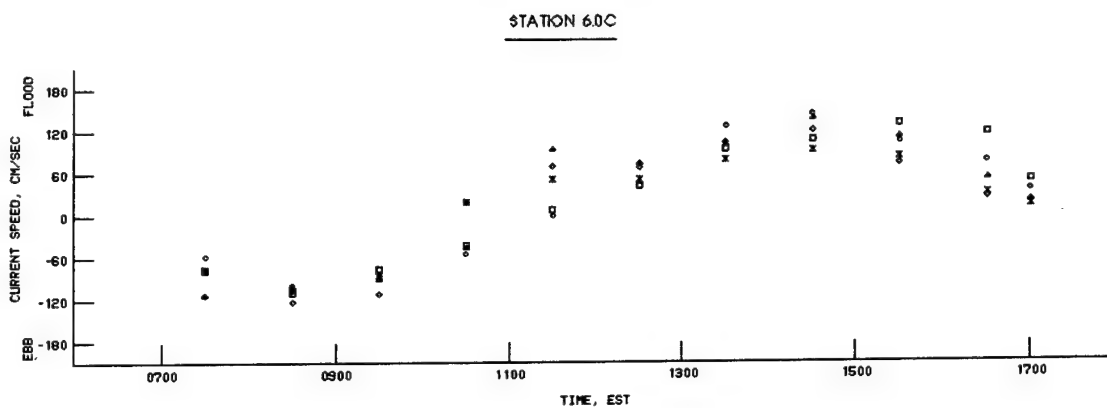
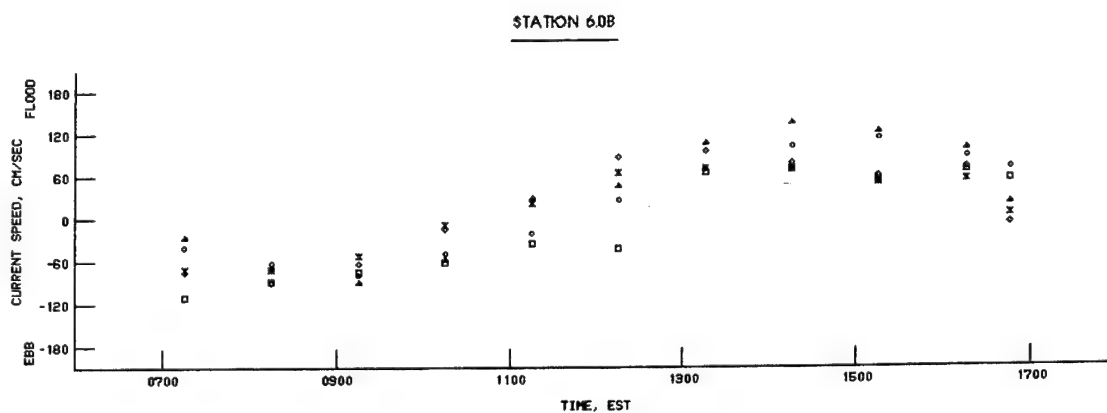
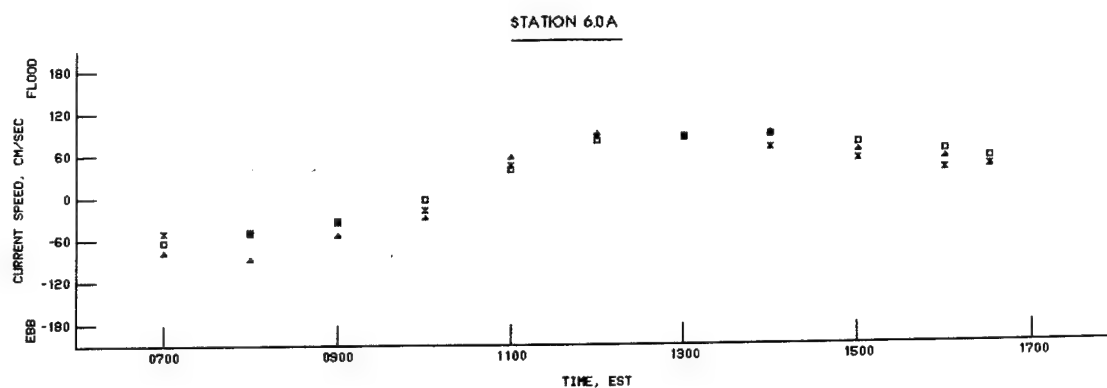
CURRENT SPEED
STATIONS S6.0A, S6.0B, AND S6.0C
10/18/92



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- ✕ - BOTTOM

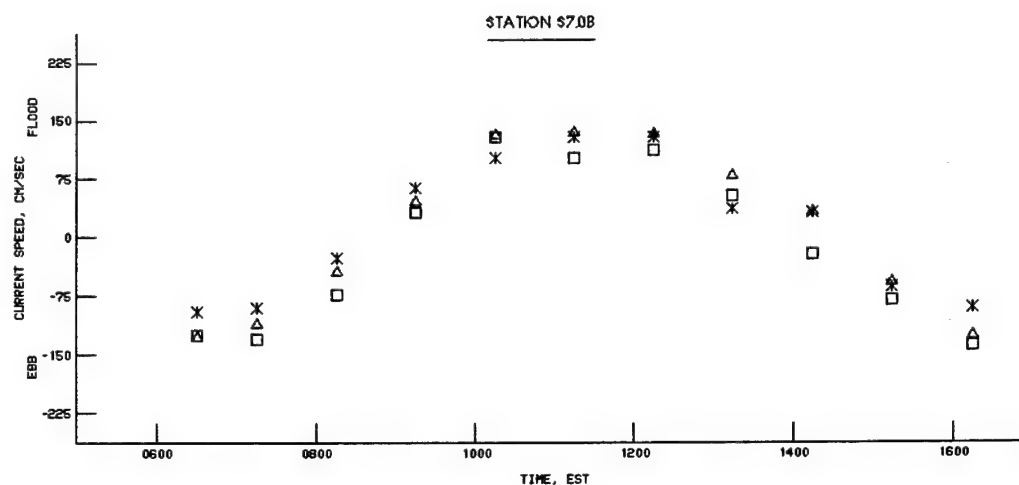
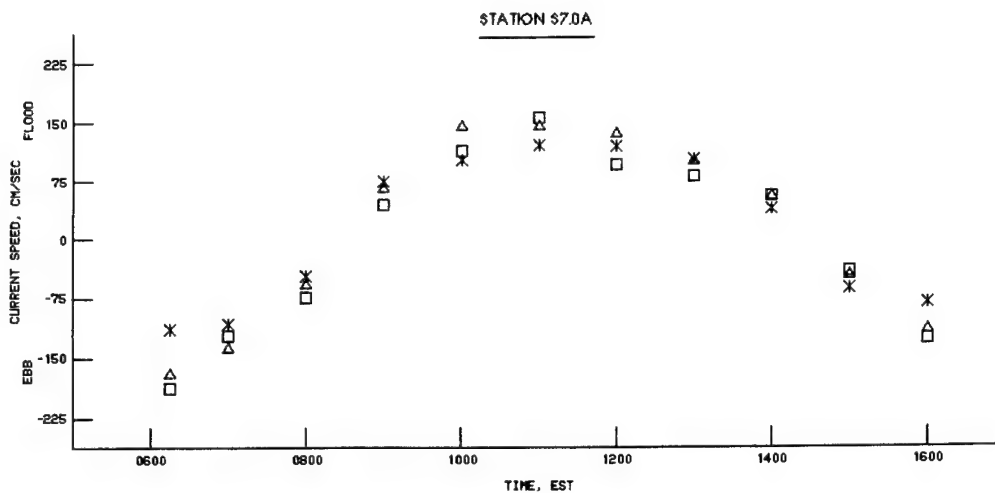
CURRENT SPEED
STATIONS S6.0A, S6.0B, AND S6.0C
10/20/92



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- × - BOTTOM

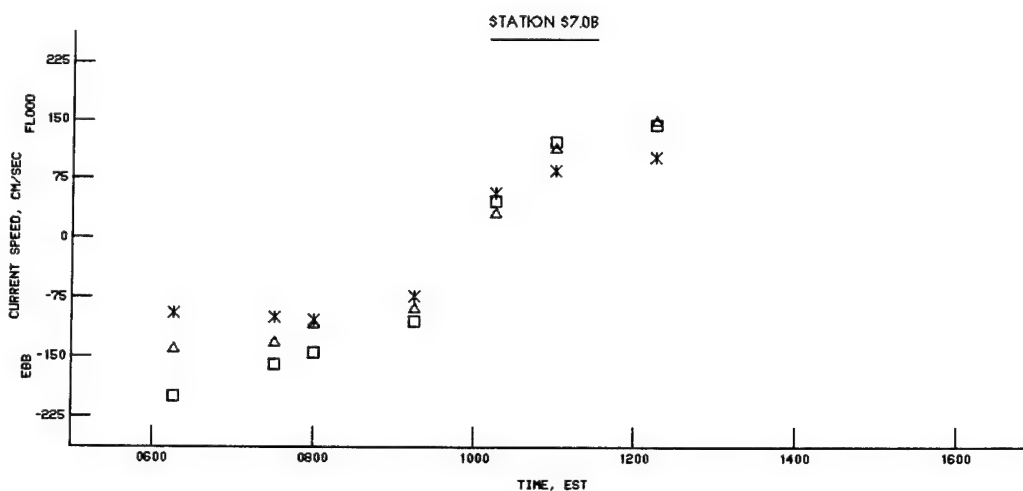
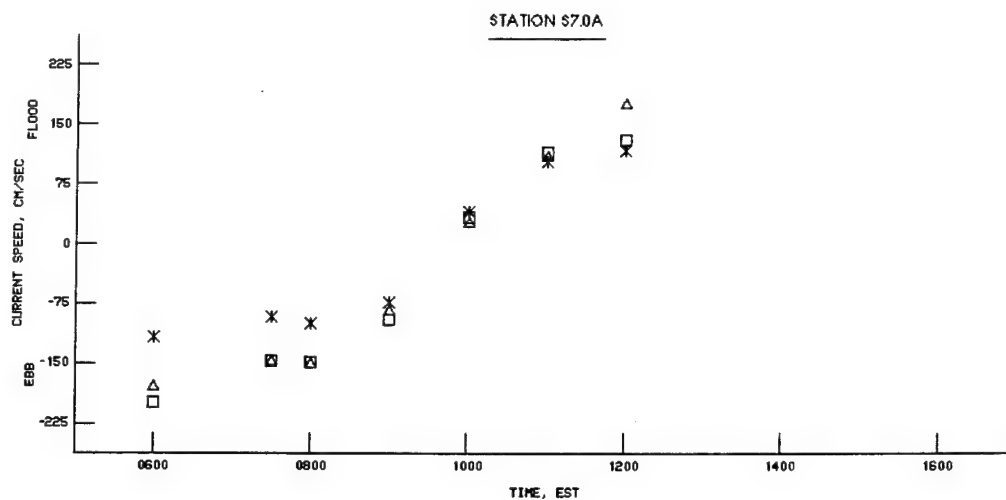
**CURRENT SPEED
STATIONS S6.0A, S6.0B, AND S6.0C
10/23/92**



LEGEND

| | |
|---|-----------|
| □ | - SURFACE |
| △ | - MIDEPTH |
| × | - BOTTOM |

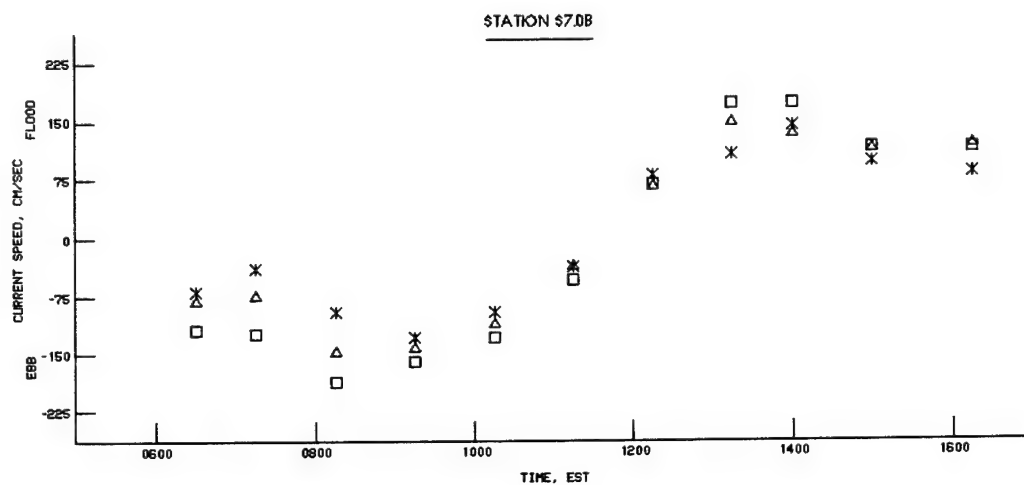
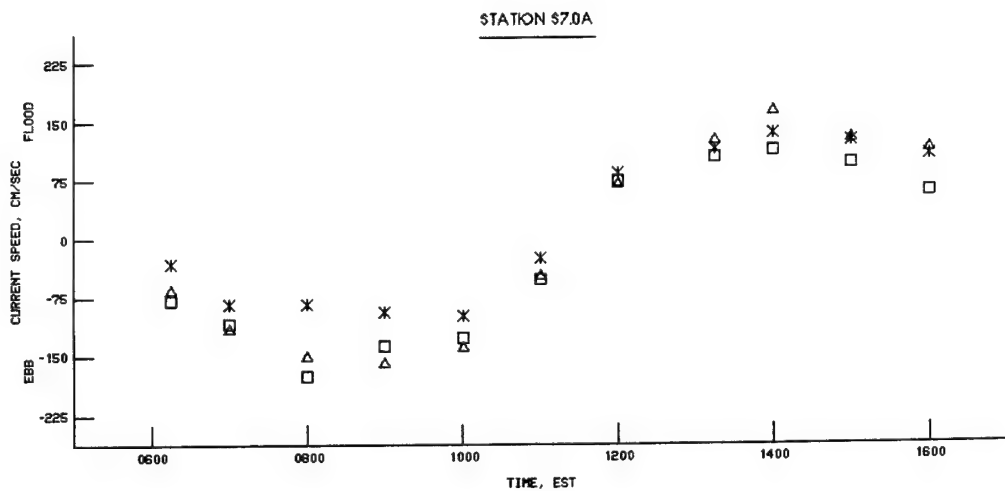
**CURRENT SPEED
STATIONS S7.0A AND S7.0B
10/14/92**



LEGEND

- - SURFACE
- △ - MIDDEPTH
- × - BOTTOM

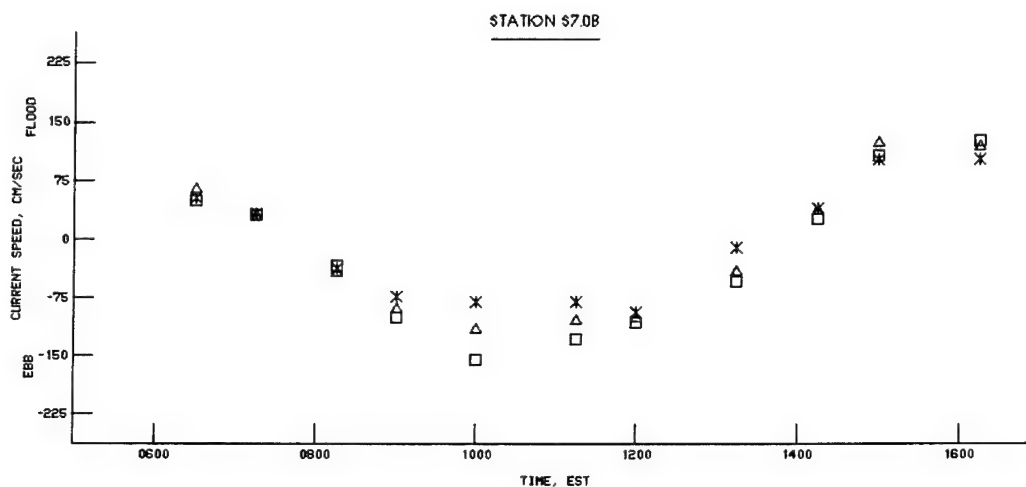
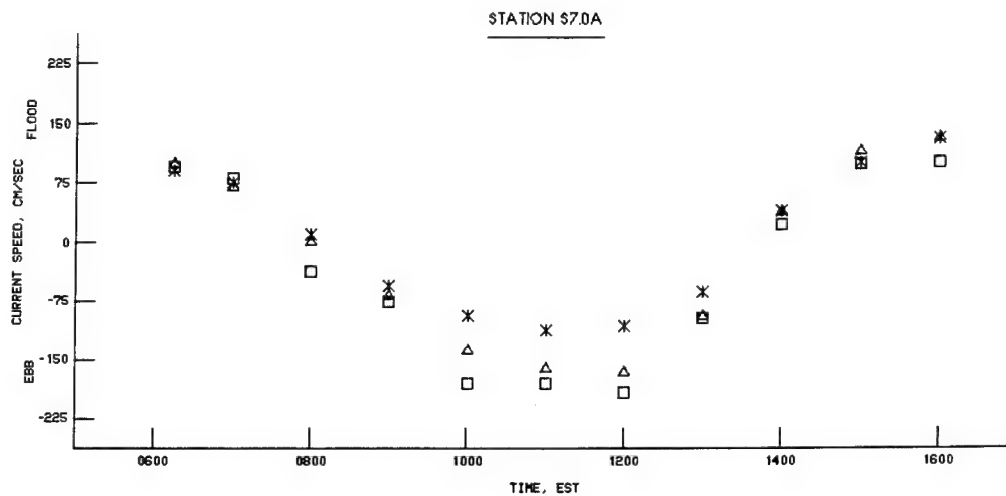
**CURRENT SPEED
STATIONS S7.0A AND S7.0B
10/16/92**



LEGEND

| | |
|---|------------|
| □ | - SURFACE |
| △ | - MIDDEPTH |
| × | - BOTTOM |

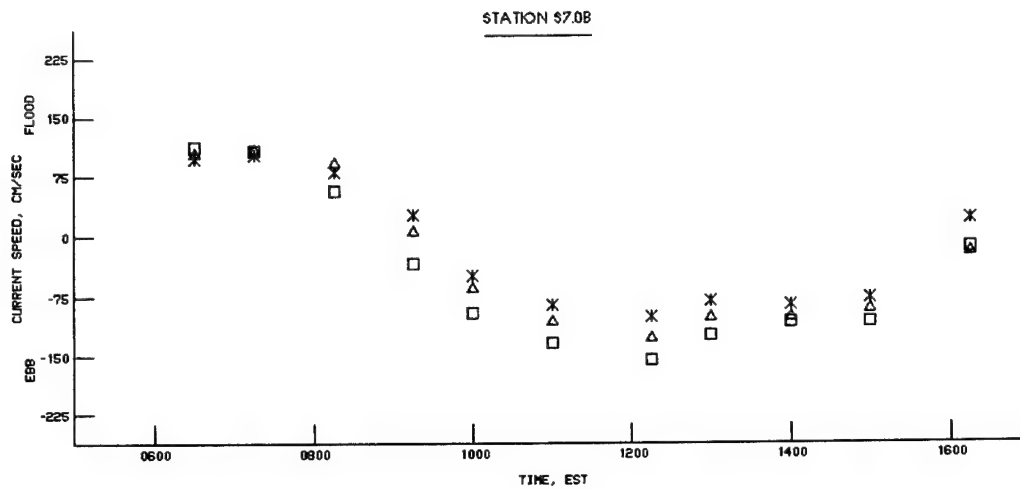
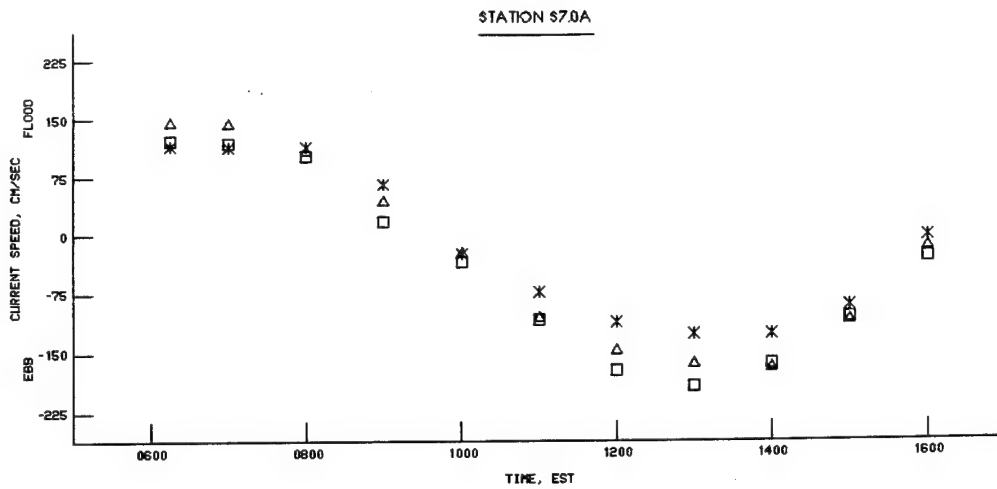
**CURRENT SPEED
STATIONS S7.0A AND S7.0B
10/18/92**



LEGEND

□ - SURFACE
 △ - MIDDEPTH
 * - BOTTOM

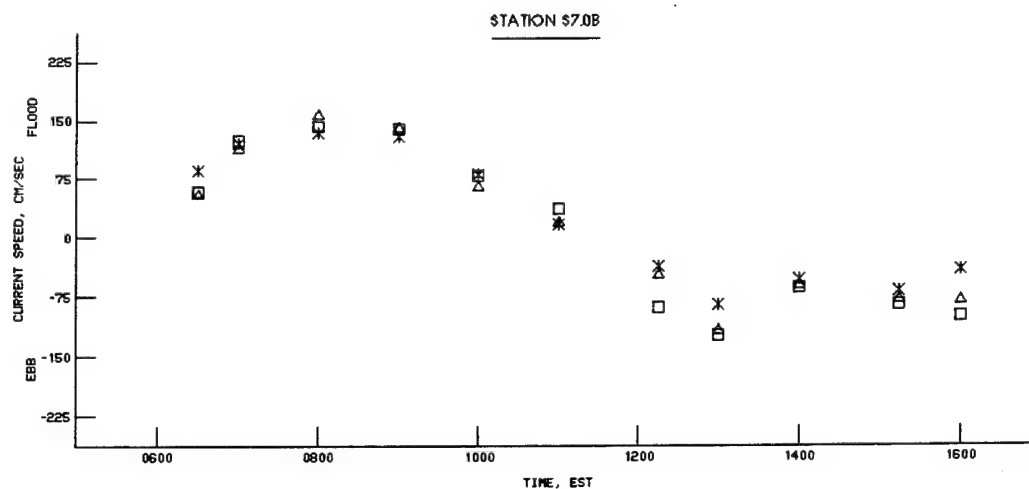
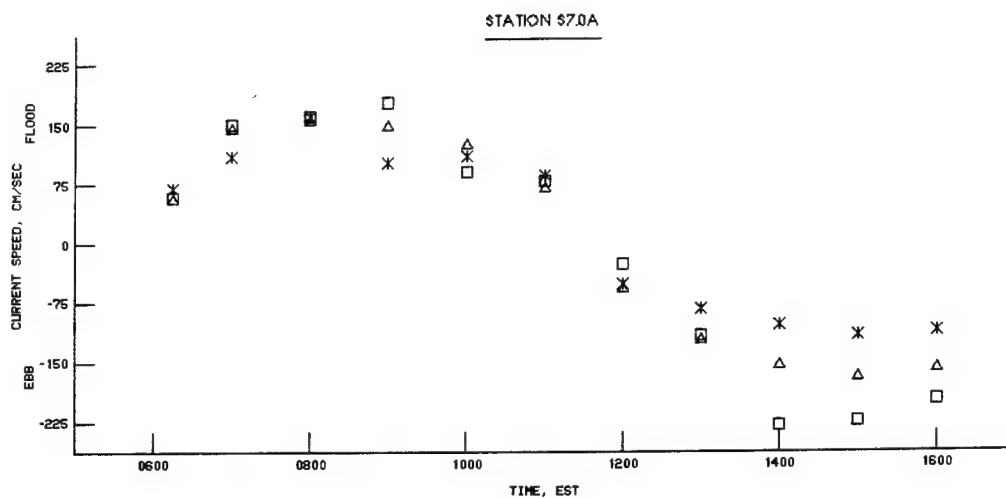
CURRENT SPEED
STATIONS S7.0A AND S7.0B
10/20/92



LEGEND

| | |
|---|-----------|
| □ | - SURFACE |
| △ | - MIDEPTH |
| × | - BOTTOM |

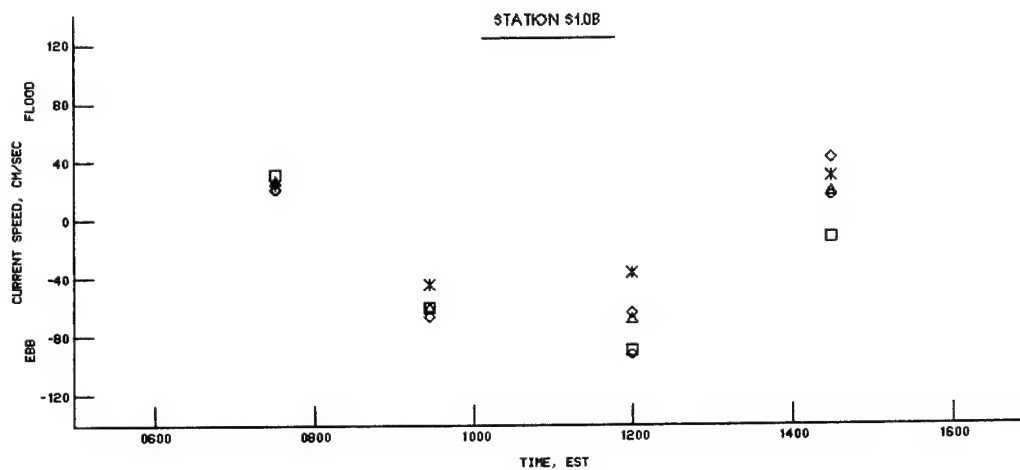
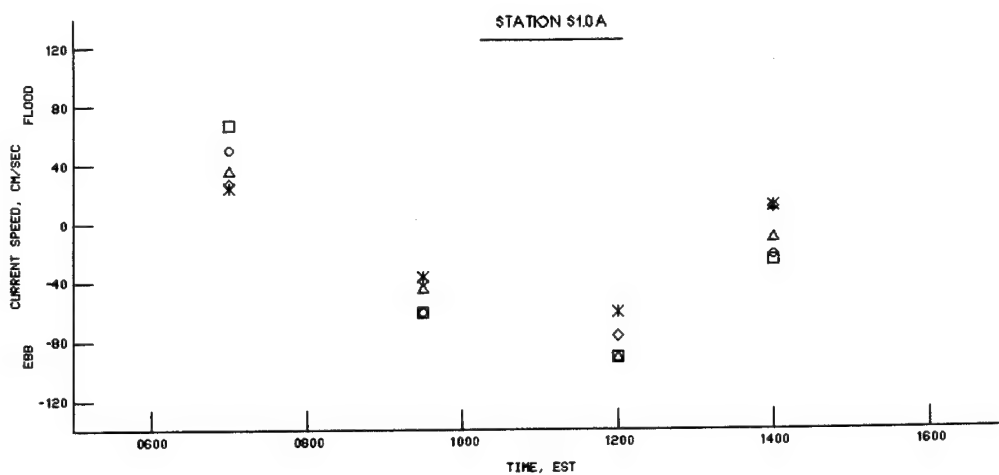
**CURRENT SPEED
STATIONS S7.0A AND S7.0B
10/22/92**



LEGEND

□ - SURFACE
 △ - MIDDEPTH
 * - BOTTOM

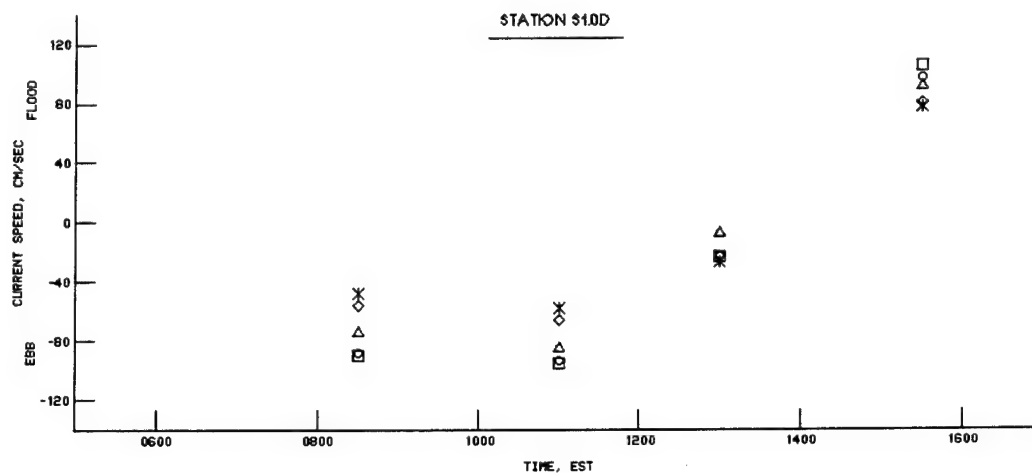
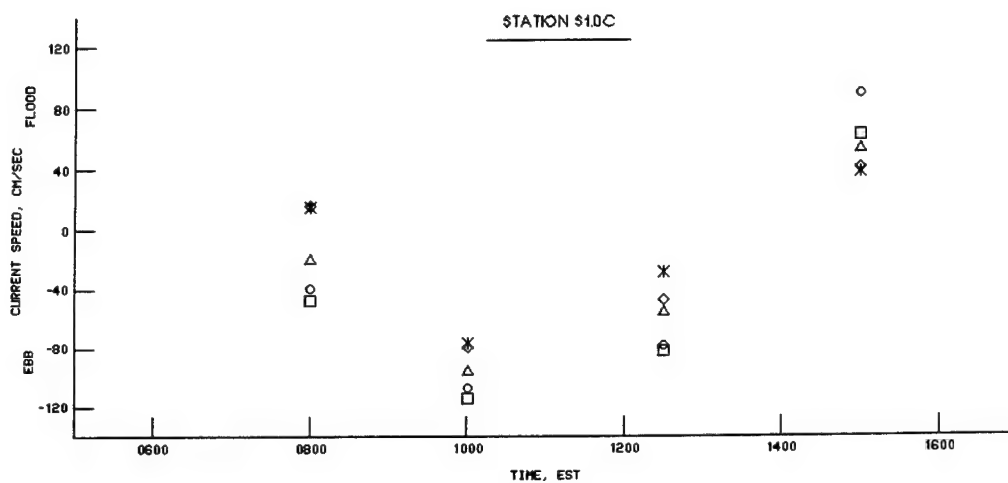
**CURRENT SPEED
 STATIONS S7.0A AND S7.0B
 10/24/92**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- ✱ - BOTTOM

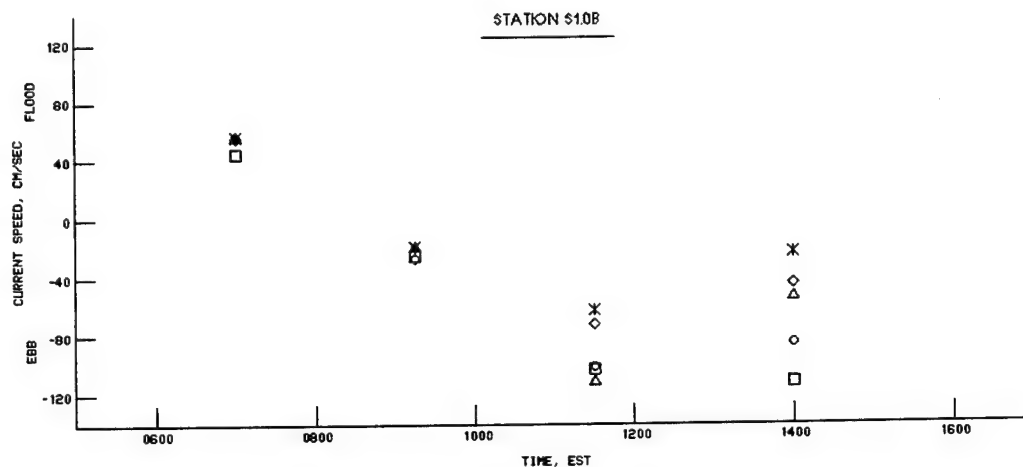
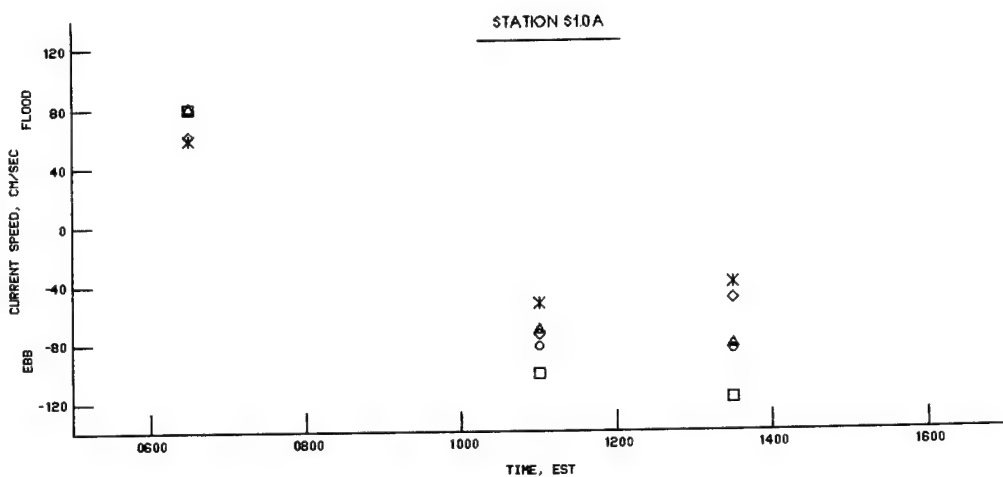
**CURRENT SPEED
STATIONS S1.0A AND S1.0B
04/19/93**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- ✱ - BOTTOM

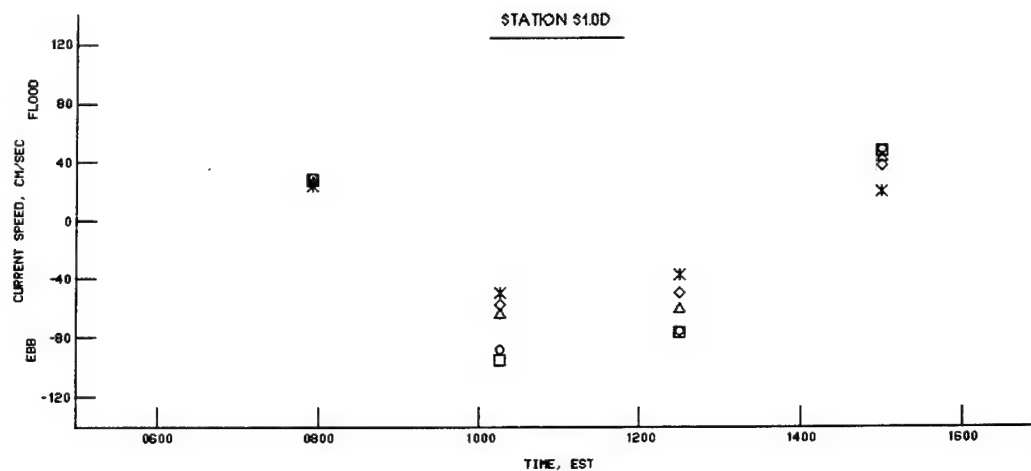
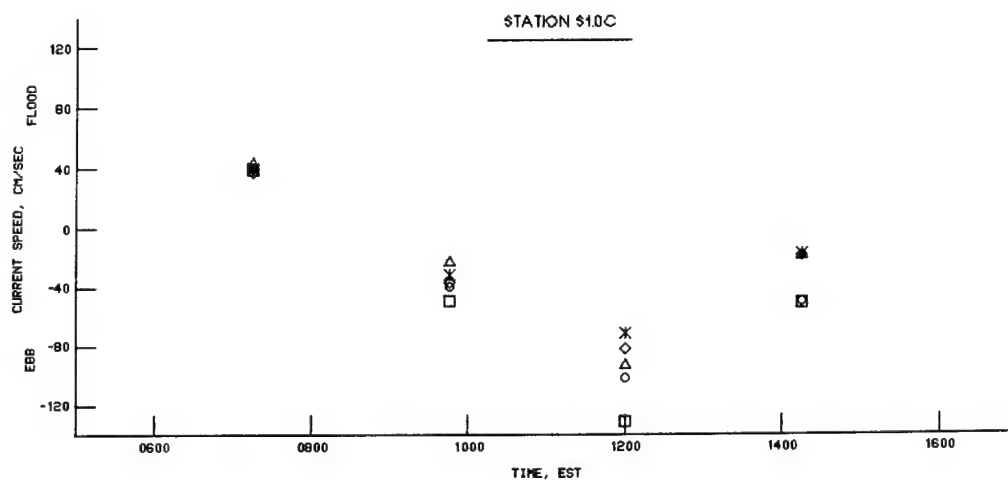
**CURRENT SPEED
STATIONS S1.0C AND S1.0D
04/19/93**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- * - BOTTOM

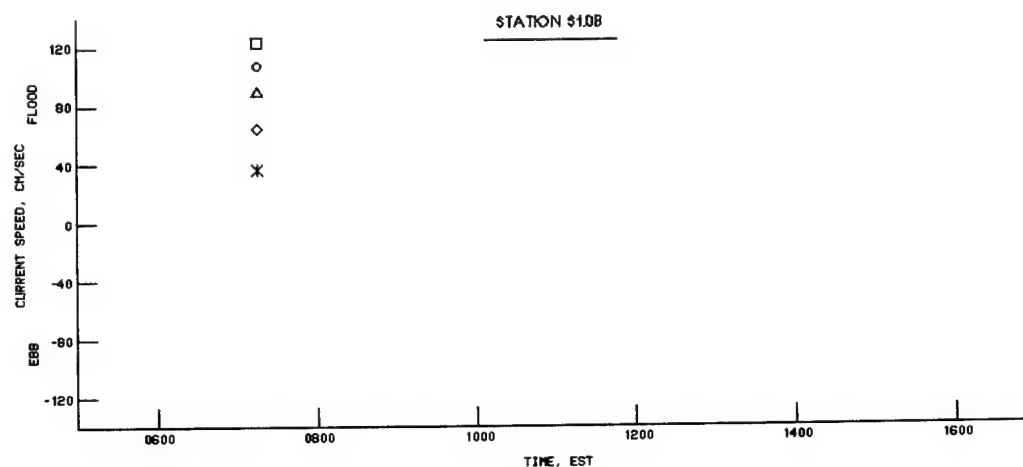
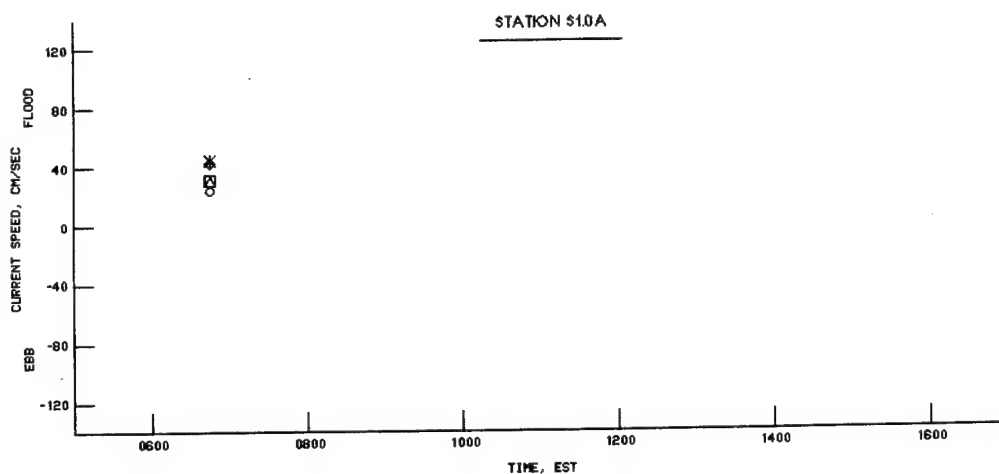
**CURRENT SPEED
STATIONS S1.0A AND S1.0B
04/21/93**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- * - BOTTOM

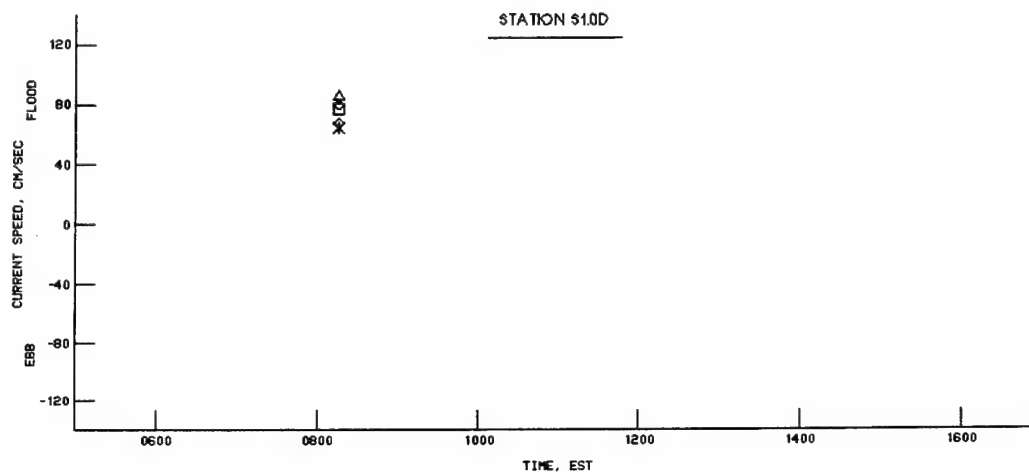
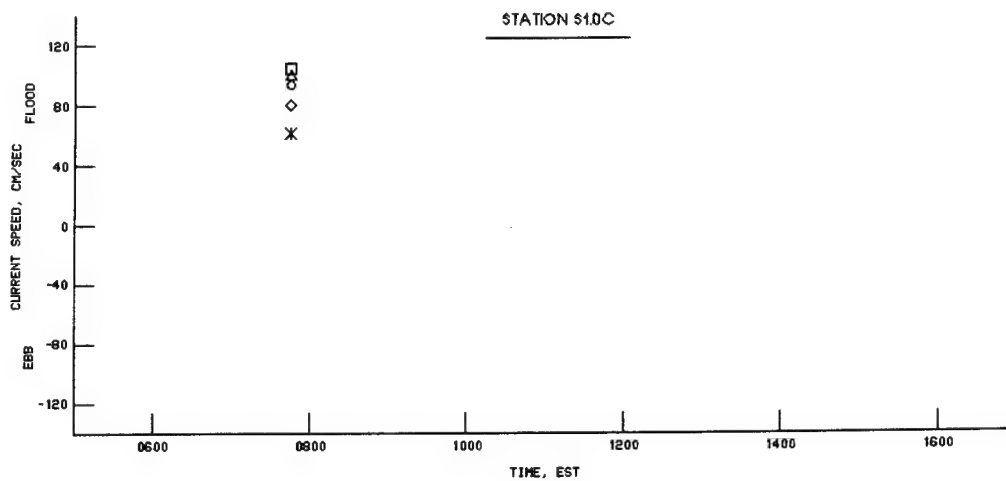
**CURRENT SPEED
STATIONS S1.0C AND S1.0D
04/21/93**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- X - BOTTOM

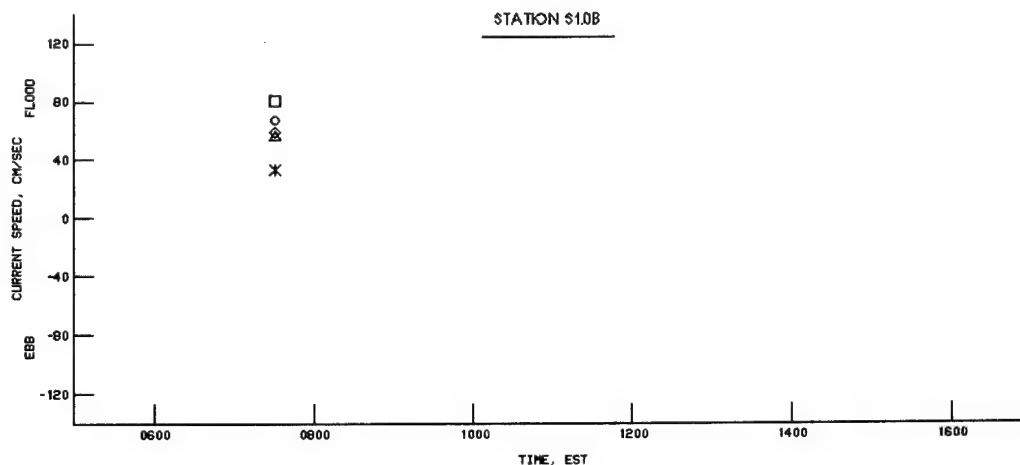
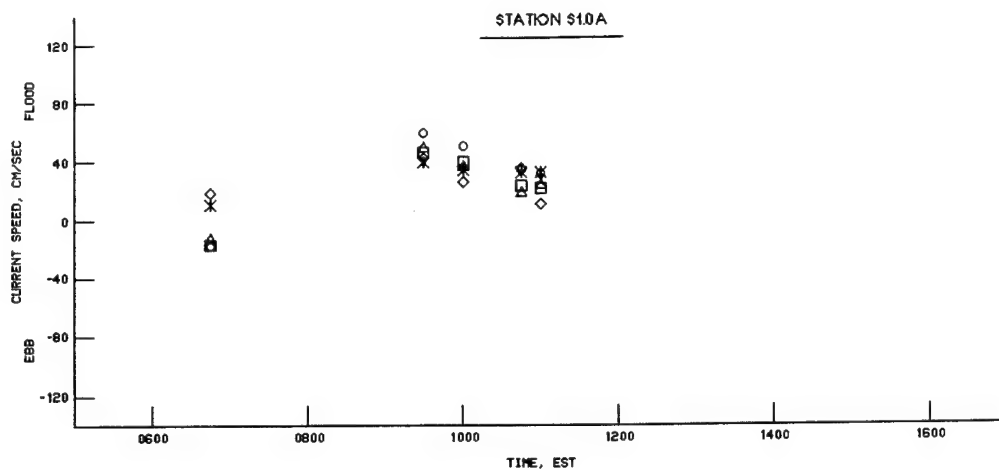
**CURRENT SPEED
STATIONS S1.0A AND S1.0B
04/24/93**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- * - BOTTOM

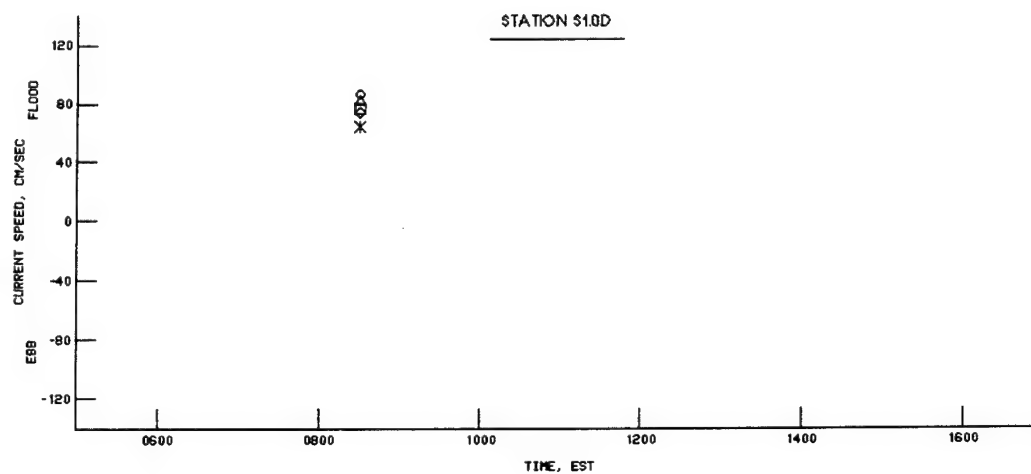
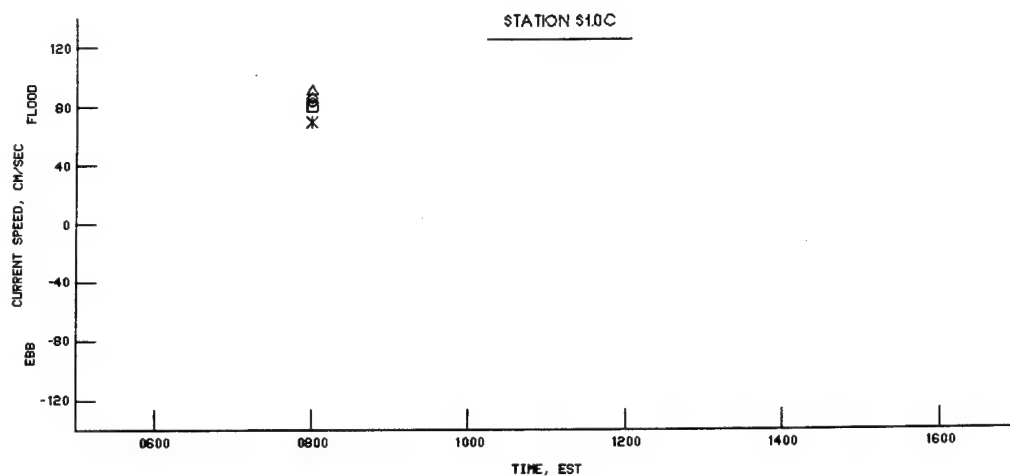
**CURRENT SPEED
STATIONS S1.0C AND S1.0D
04/24/93**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- ✱ - BOTTOM

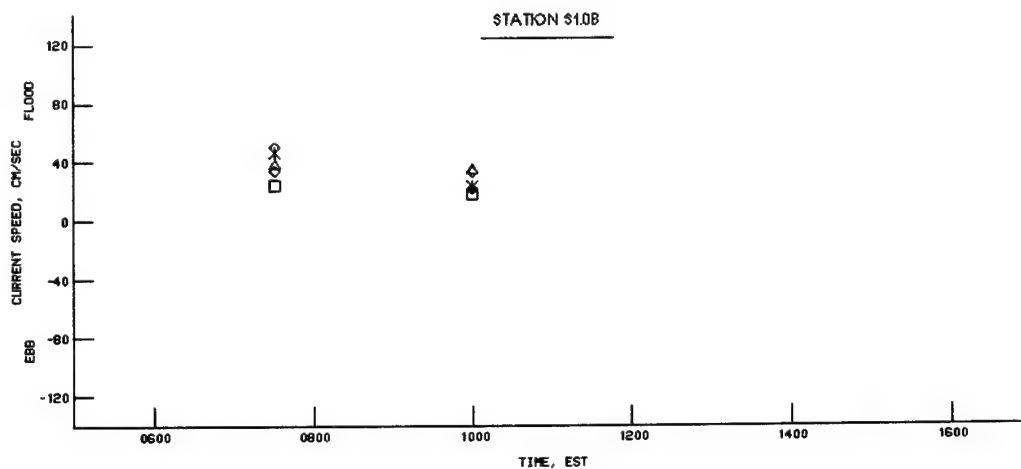
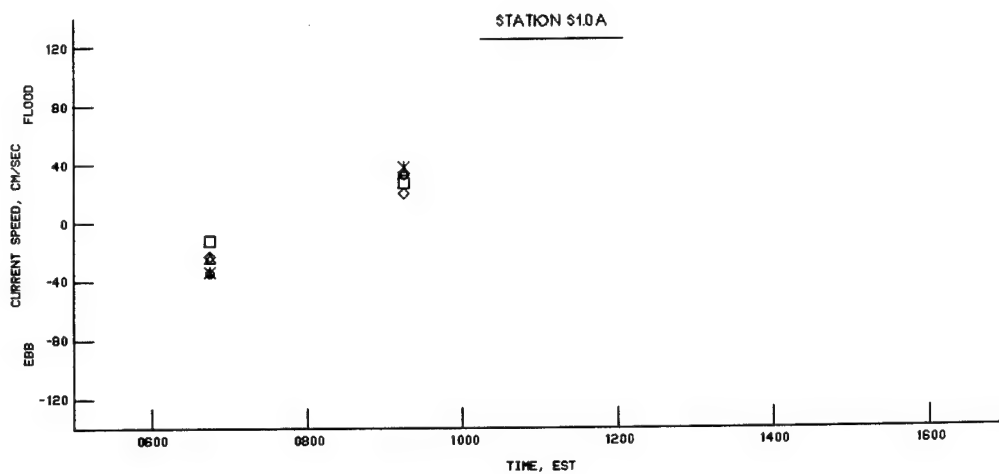
**CURRENT SPEED
STATIONS S1.0A AND S1.0B
04/25/93**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- * - BOTTOM

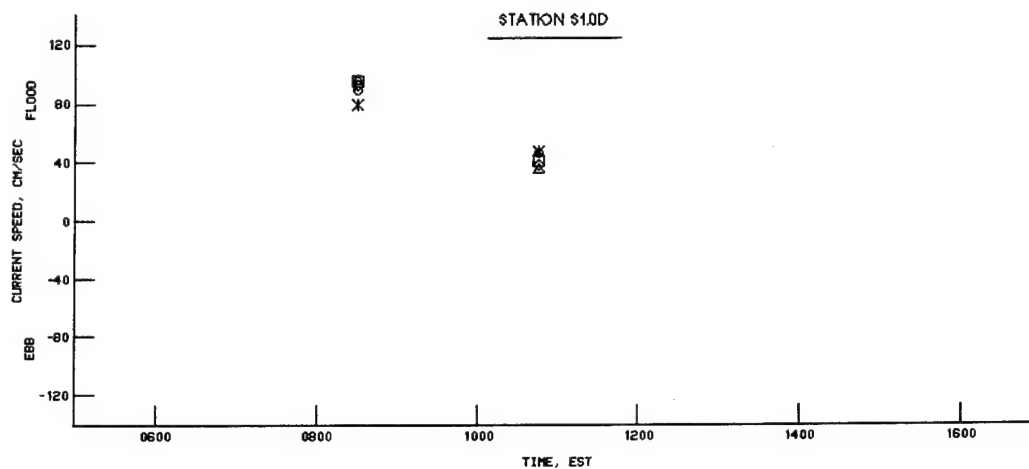
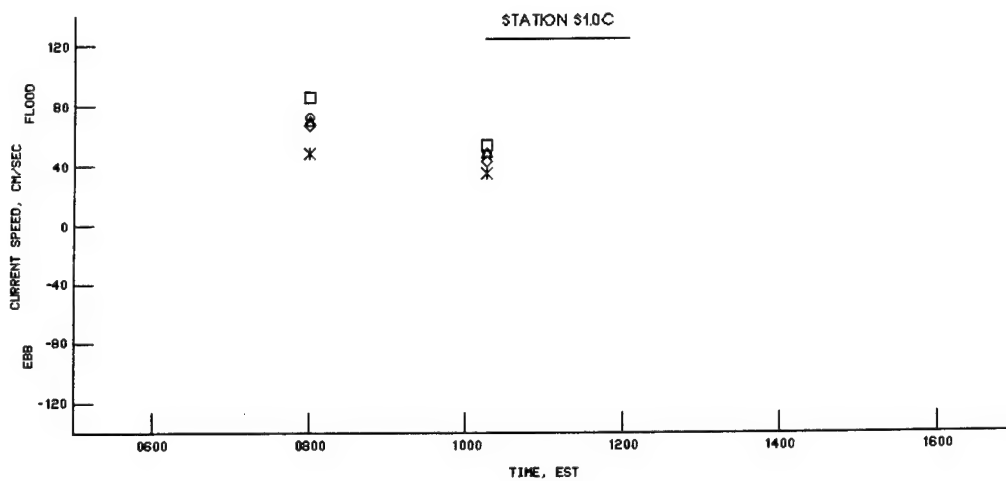
**CURRENT SPEED
STATIONS S1.0C AND S1.0D
04/25/93**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- ✱ - BOTTOM

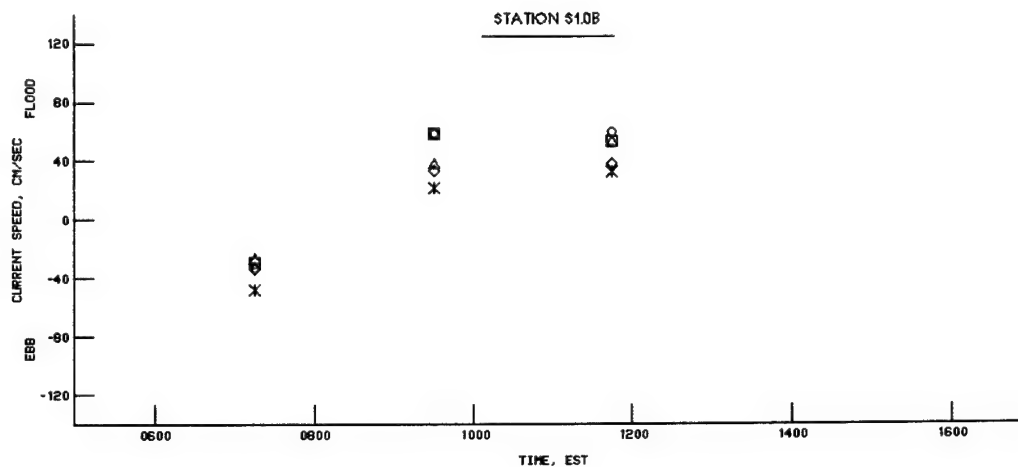
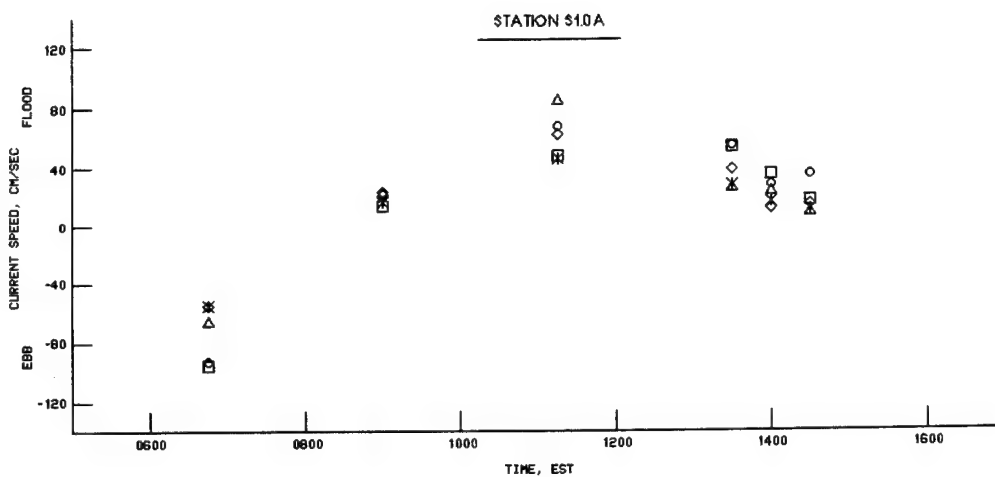
**CURRENT SPEED
STATIONS S1.0A AND S1.0B
04/26/93**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- ✕ - BOTTOM

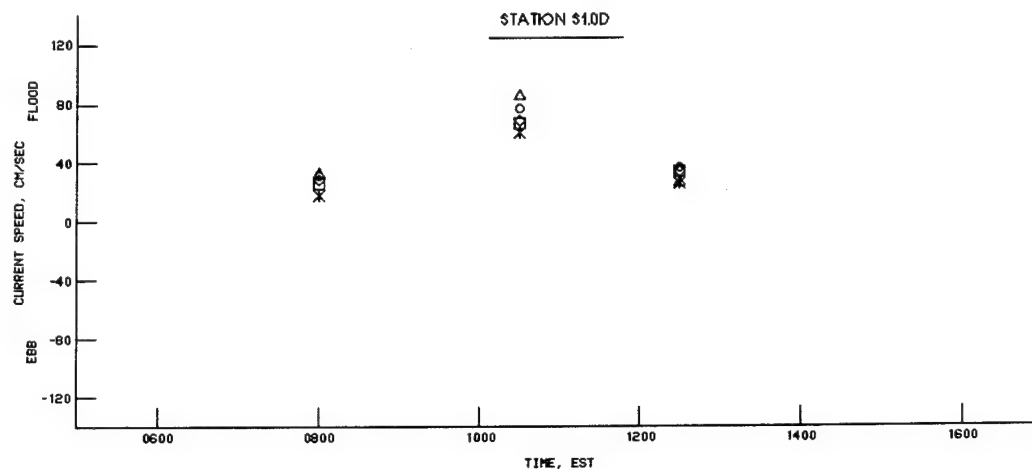
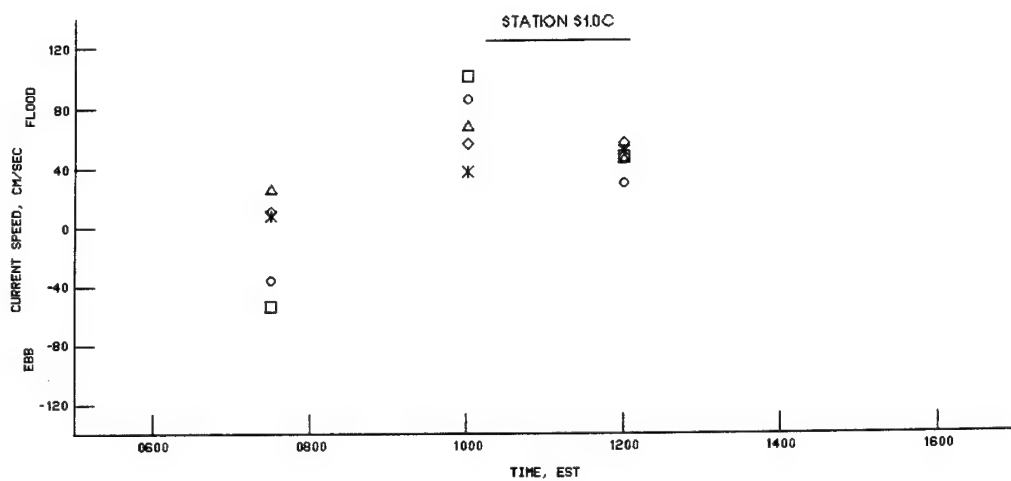
**CURRENT SPEED
STATIONS S1.0C AND S1.0D
04/26/93**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- ✱ - BOTTOM

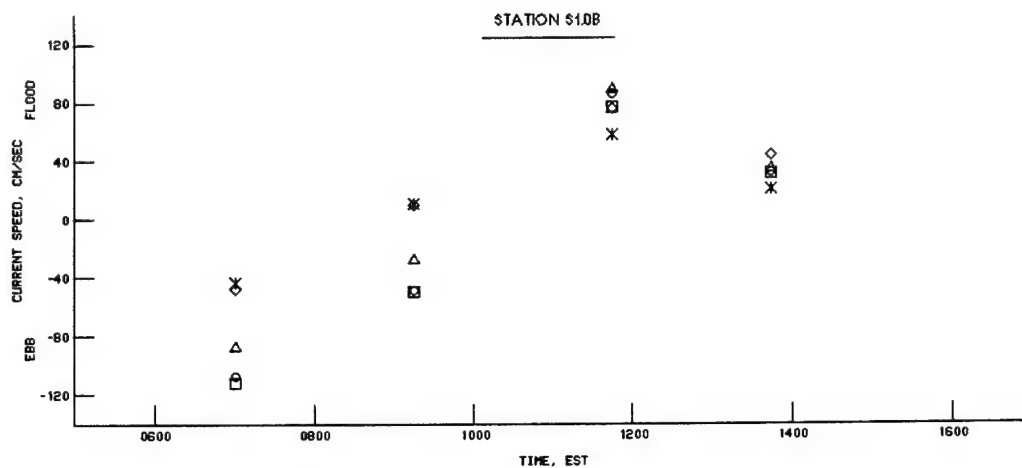
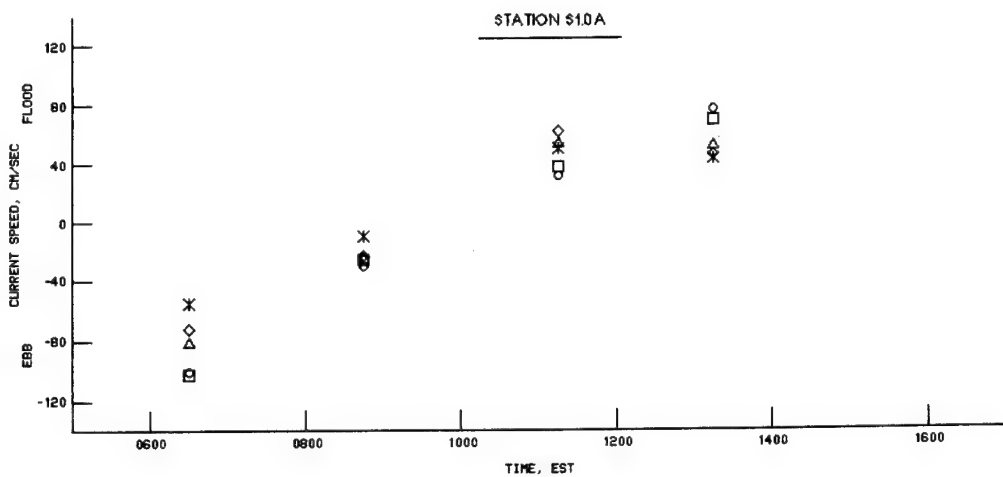
**CURRENT SPEED
STATIONS S1.0A AND S1.0B
04/28/93**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- ✱ - BOTTOM

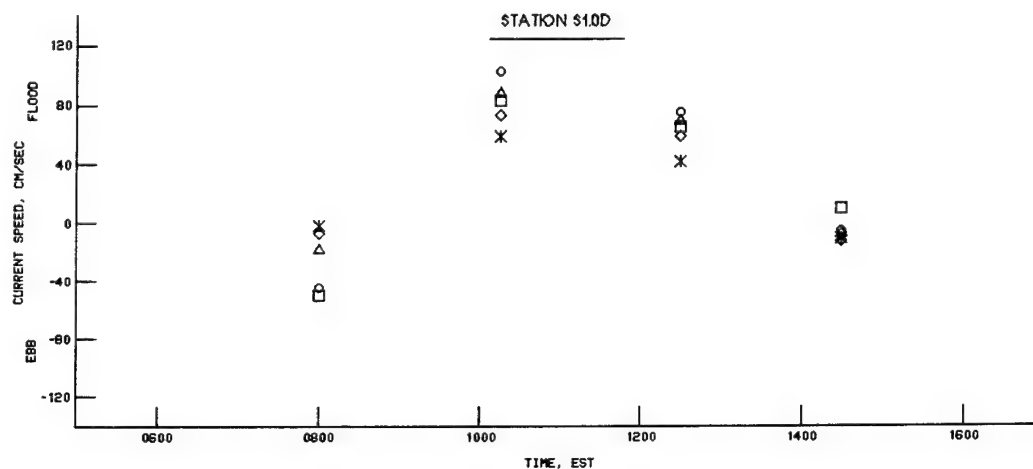
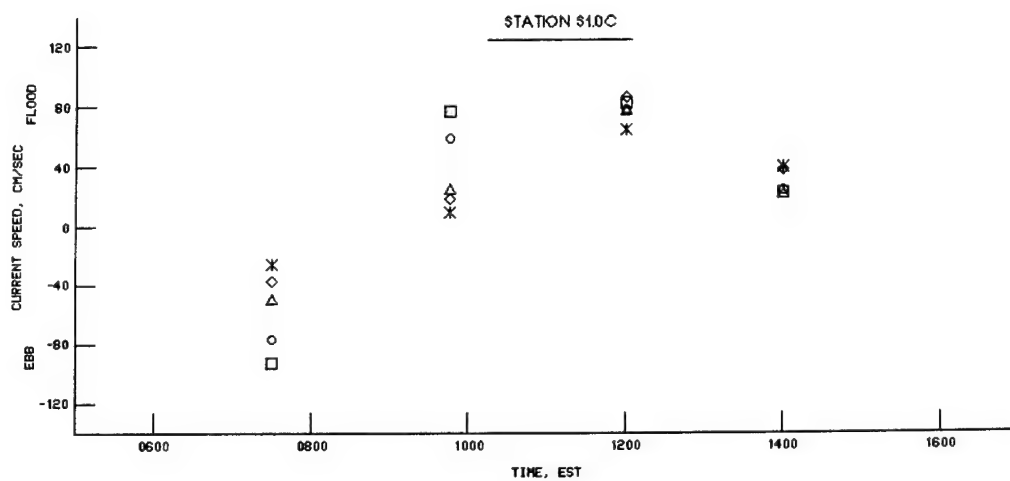
**CURRENT SPEED
STATIONS S1.0C AND S1.0D
04/28/93**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- × - BOTTOM

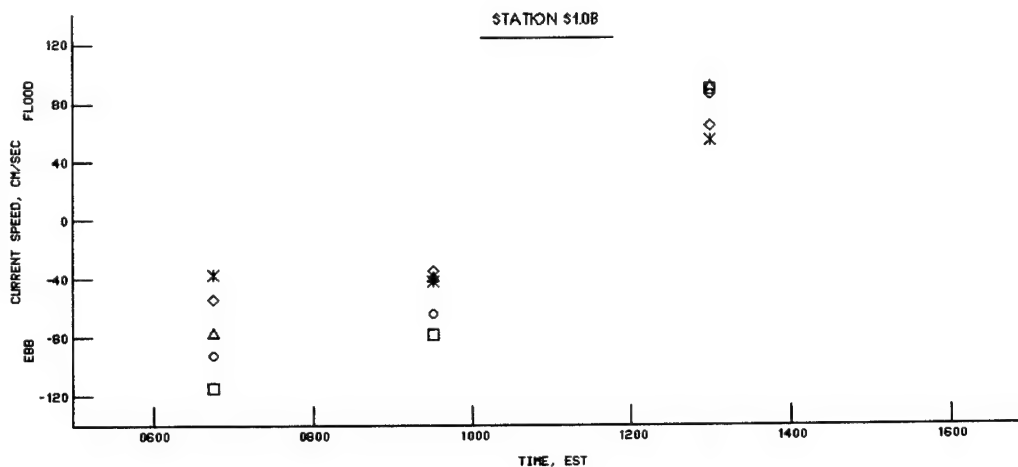
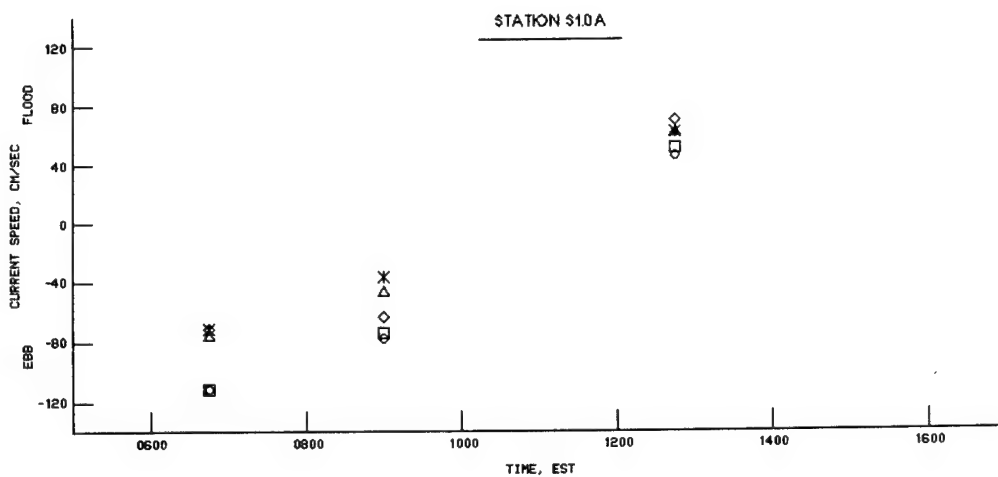
**CURRENT SPEED
STATIONS S1.0A AND S1.0B
04/29/93**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- ✕ - BOTTOM

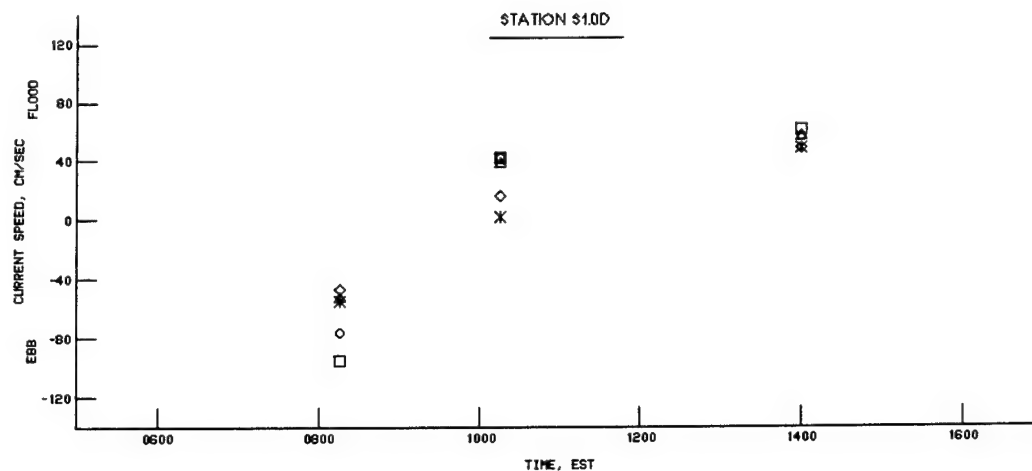
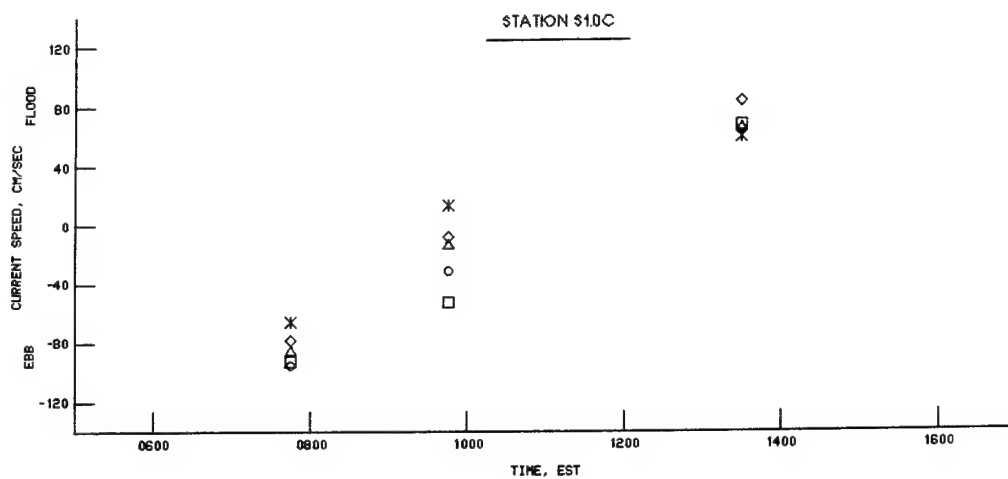
**CURRENT SPEED
STATIONS S1.0C AND S1.0D
04/29/93**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- ✕ - BOTTOM

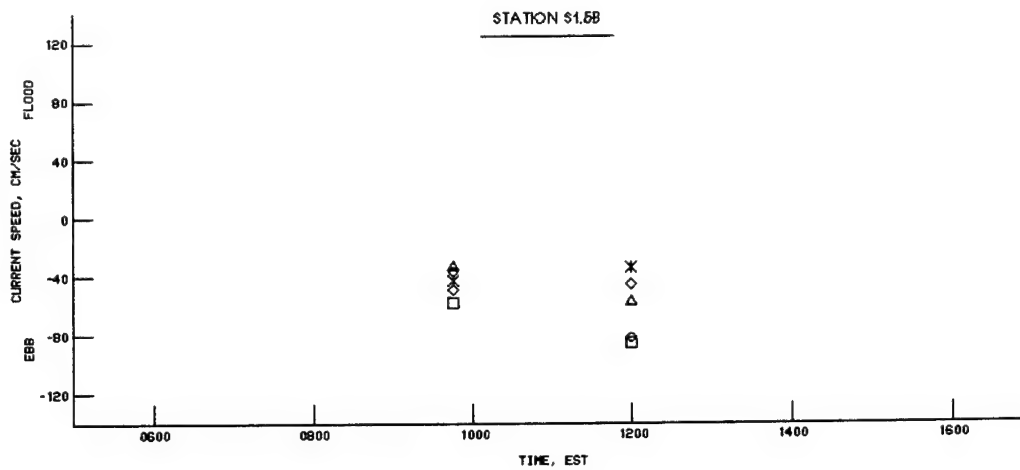
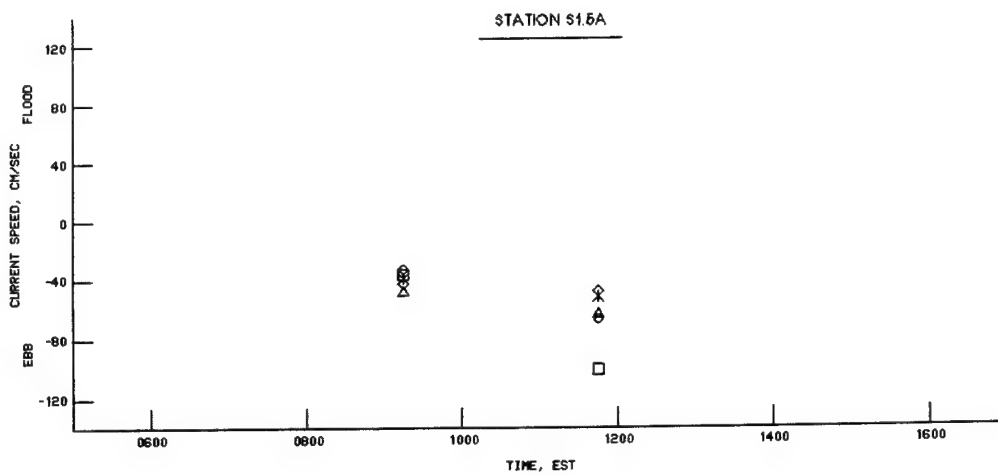
**CURRENT SPEED
STATIONS S1.0A AND S1.0B
04/30/93**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- ✱ - BOTTOM

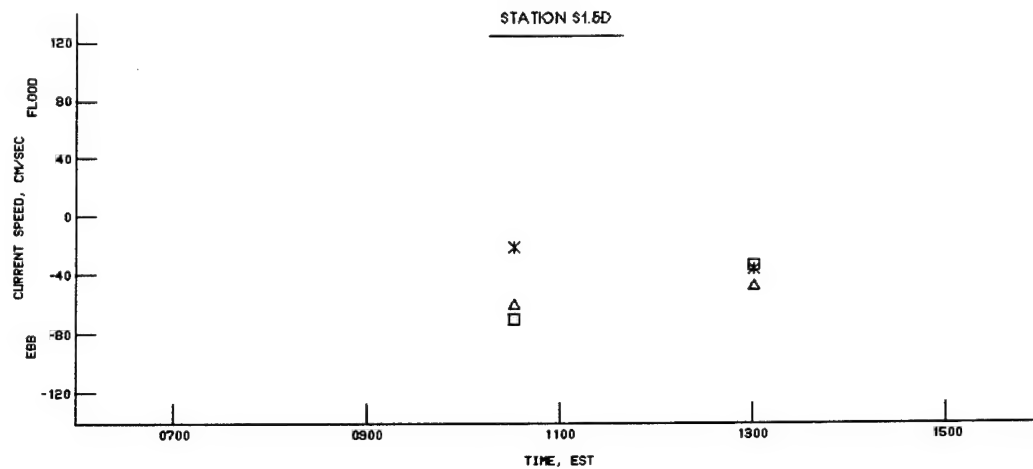
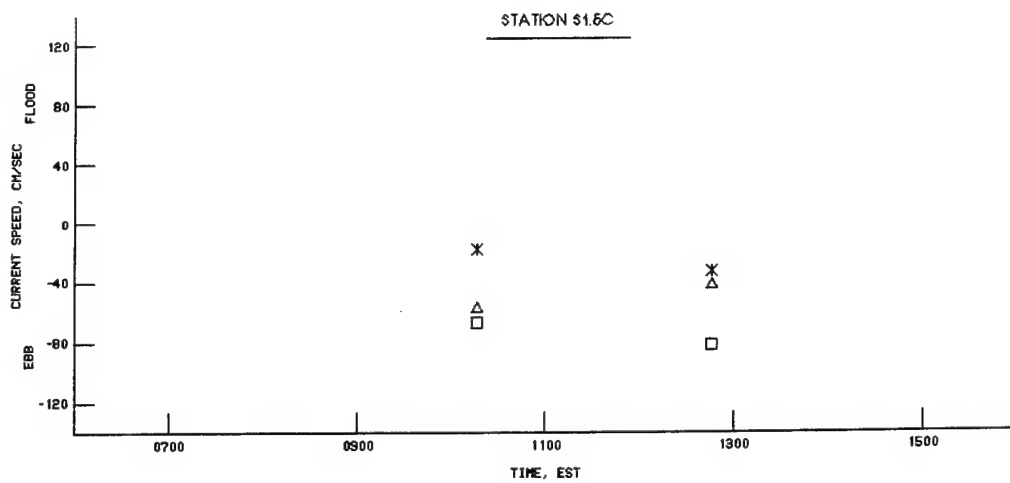
**CURRENT SPEED
STATIONS S1.0C AND S1.0D
04/30/93**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- ✕ - BOTTOM

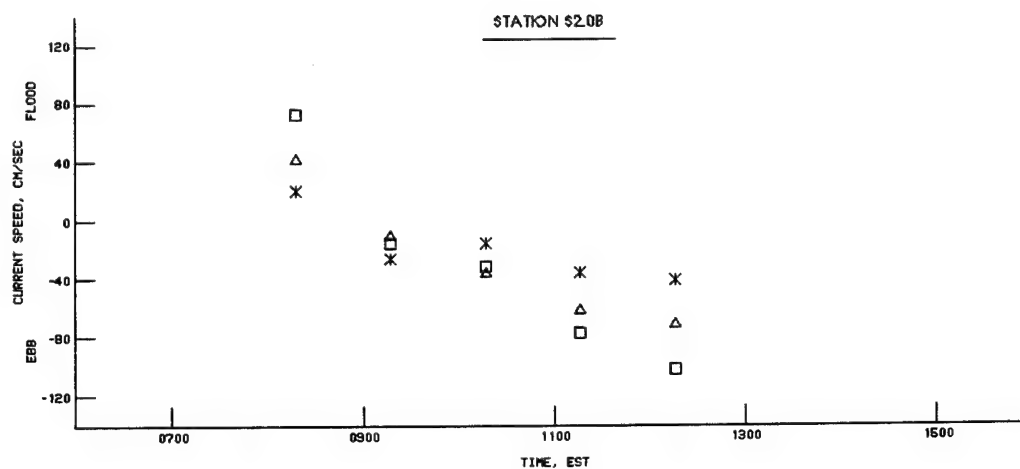
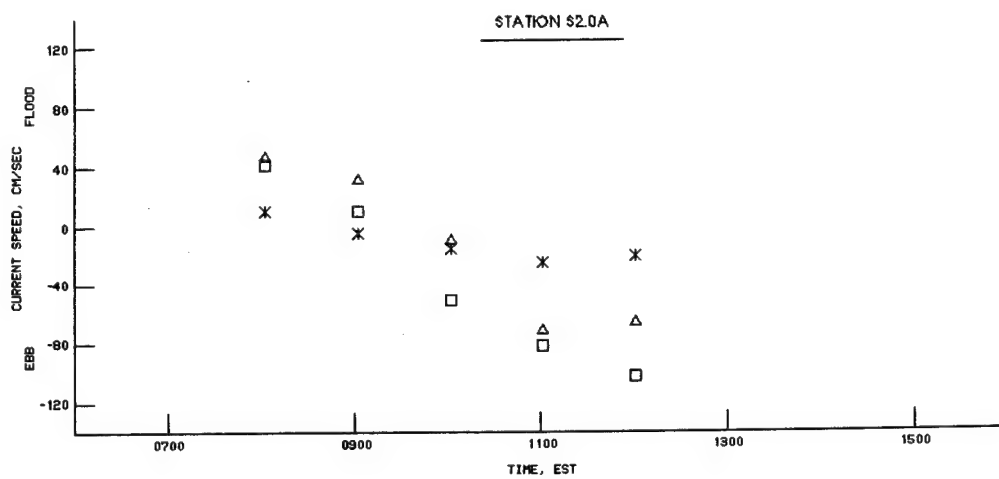
**CURRENT SPEED
STATIONS S1.5A AND S1.5B
04/19/93**



LEGEND

- - SURFACE
- △ - MIDDEPTH
- ✱ - BOTTOM

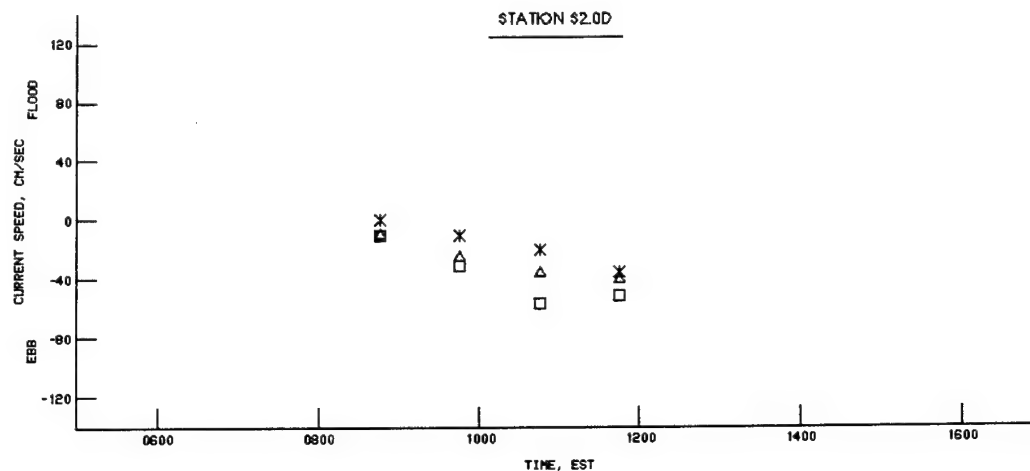
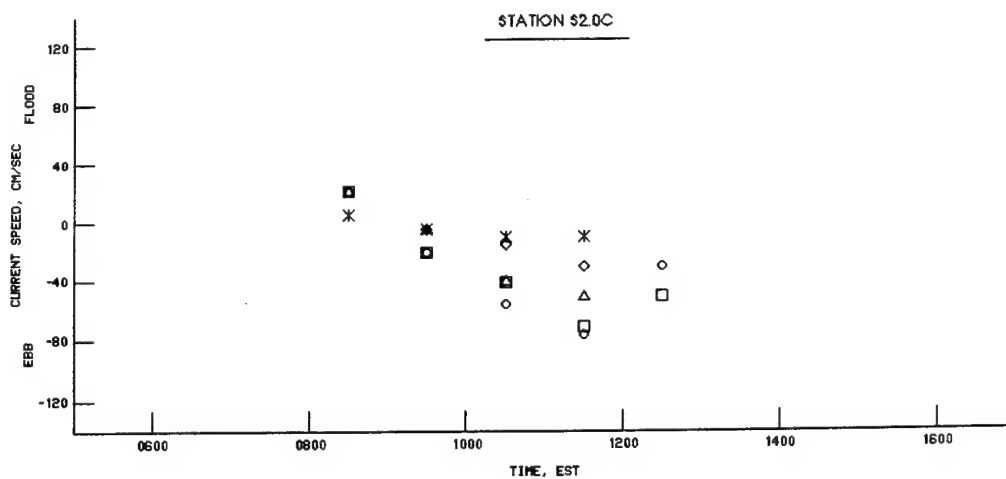
**CURRENT SPEED
STATIONS S1.5C AND S1.5D
04/19/93**



LEGEND

- - SURFACE
- △ - MIDDEPTH
- * - BOTTOM

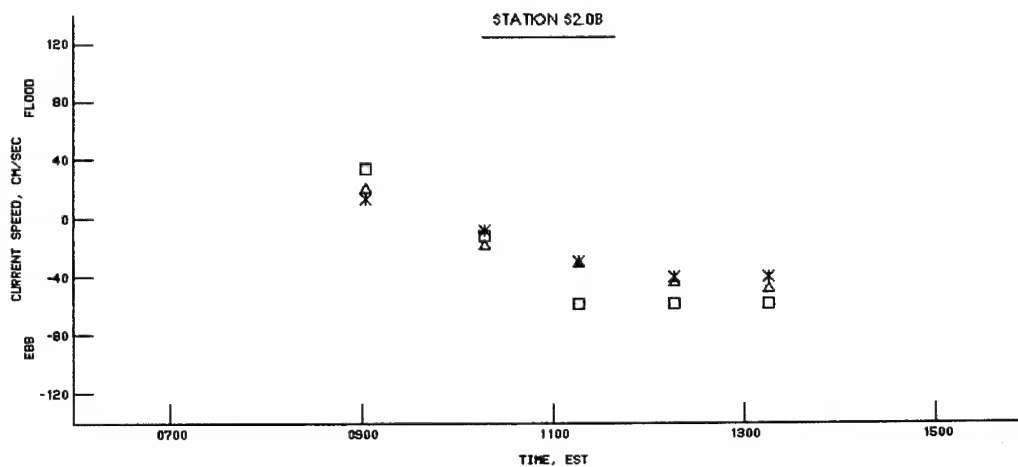
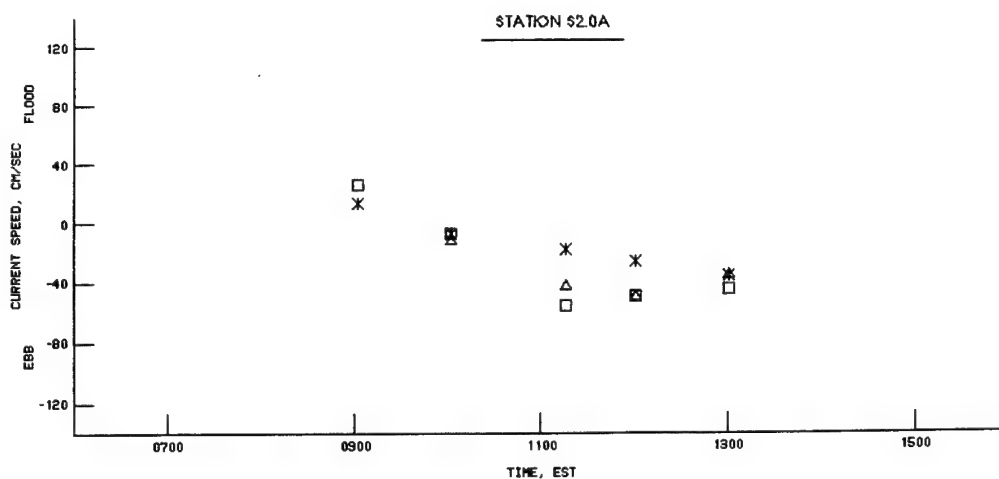
**CURRENT SPEED
STATIONS S2.0A AND 2.0B
04/19/93**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- * - BOTTOM

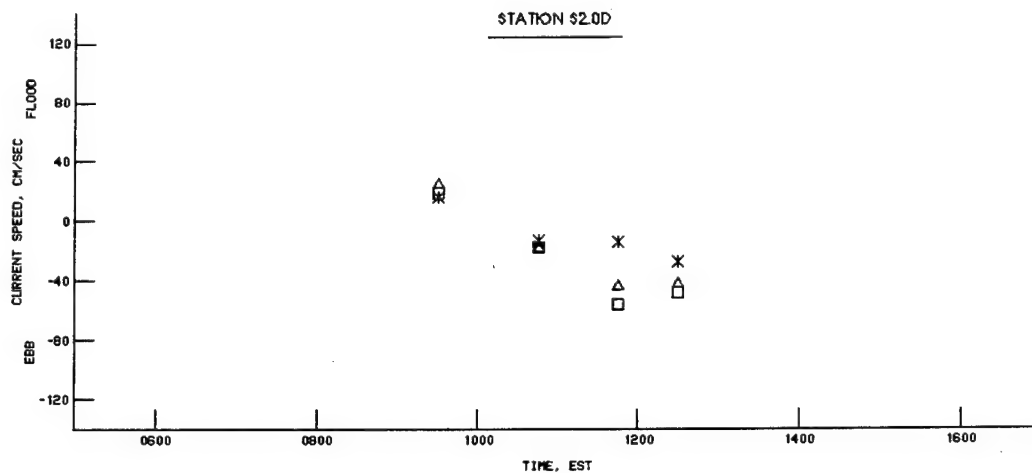
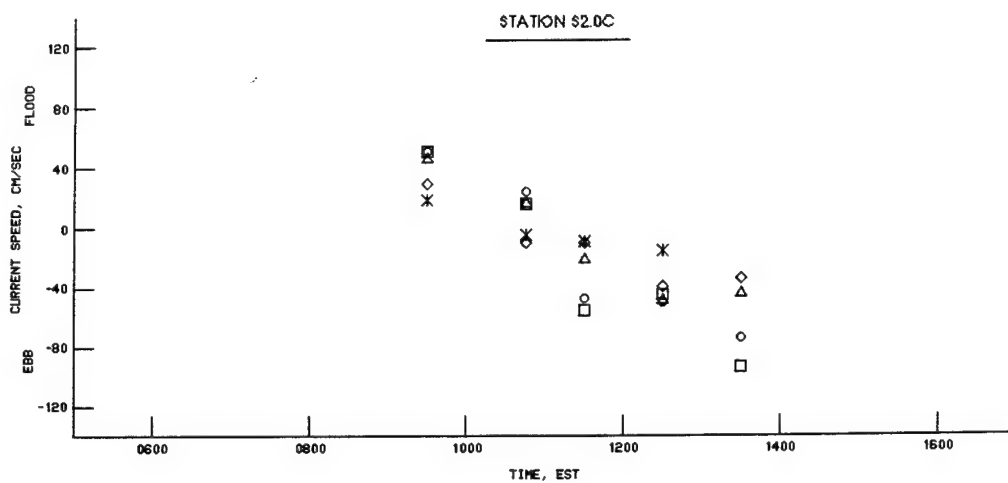
**CURRENT SPEED
STATIONS S2.0C AND S2.0D
04/19/93**



LEGEND

- - SURFACE
- △ - MIDDEPTH
- * - BOTTOM

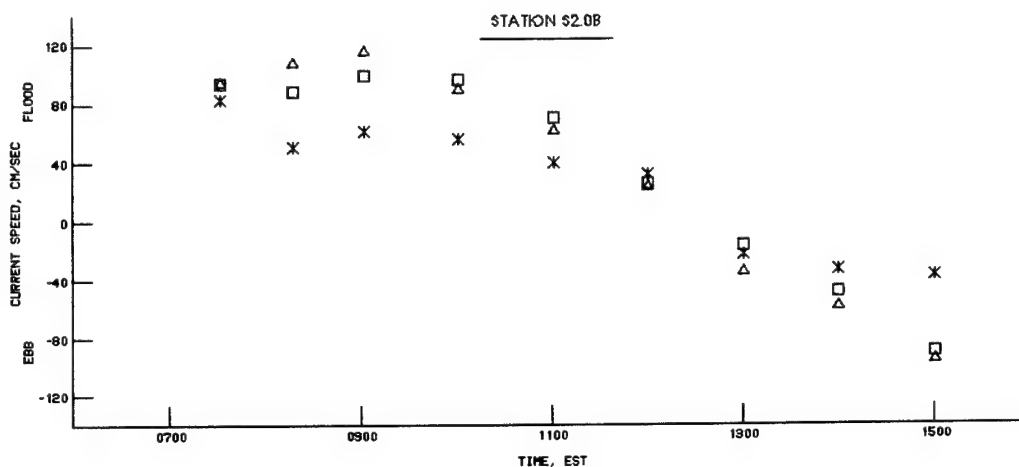
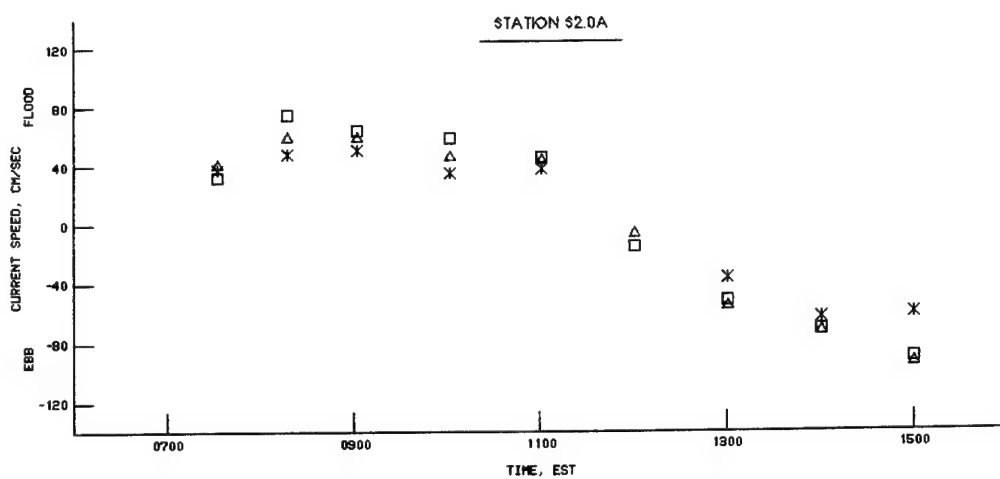
**CURRENT SPEED
STATIONS S2.0A AND S2.0B
04/21/93**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- ✕ - BOTTOM

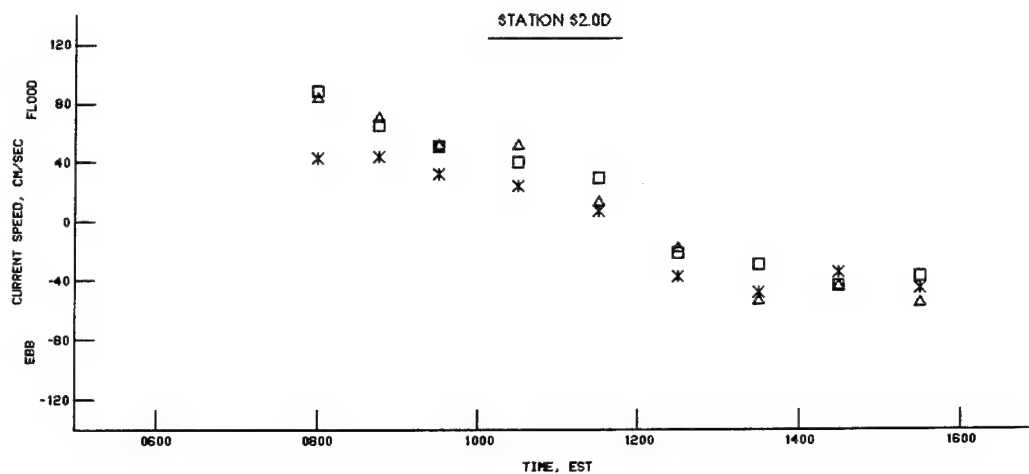
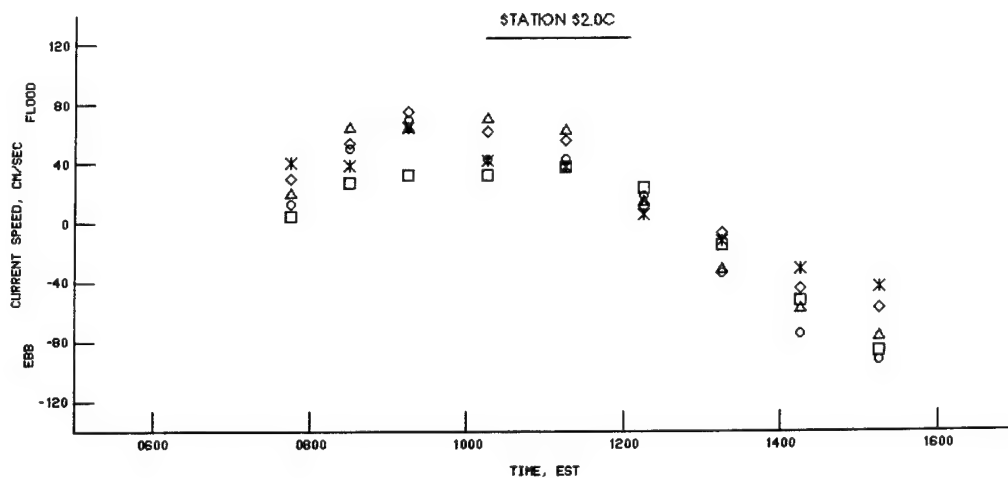
**CURRENT SPEED
STATIONS S2.0C AND S2.0D
04/21/93**



LEGEND

- - SURFACE
- △ - MIDDEPTH
- × - BOTTOM

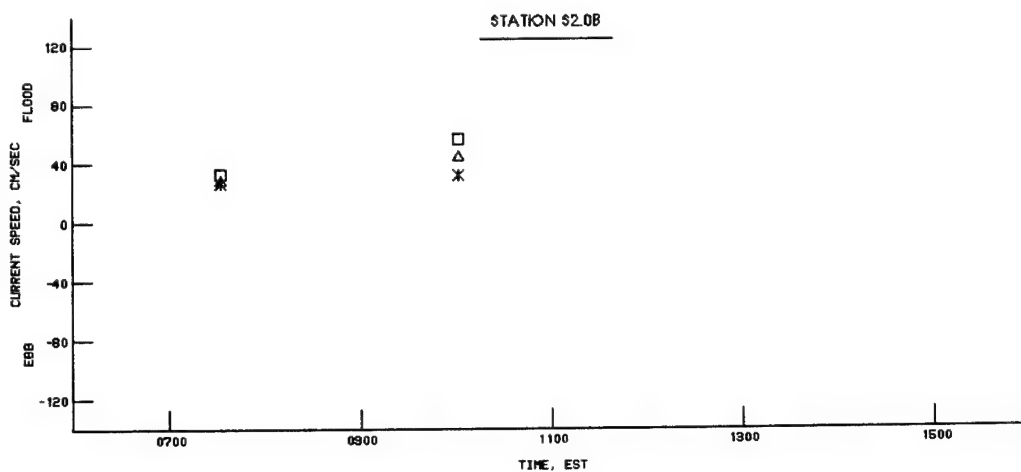
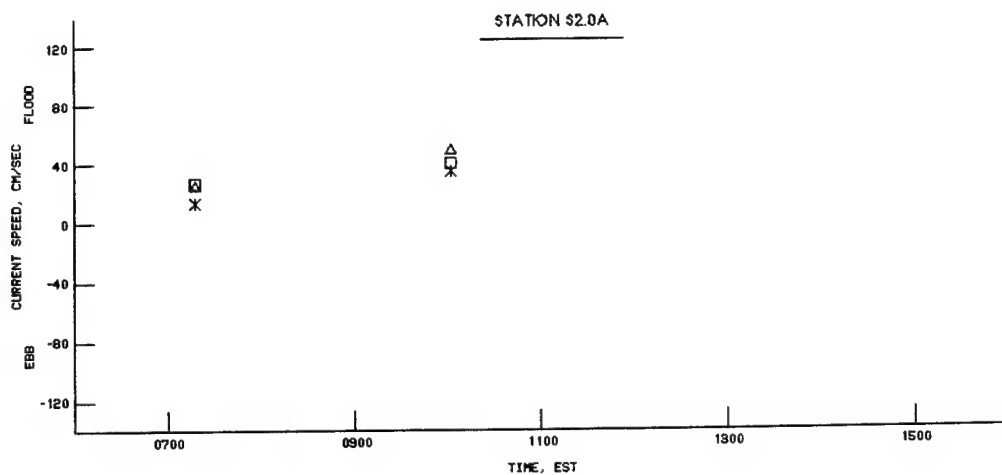
**CURRENT SPEED
STATIONS S2.0A AND S2.0B
04/24/93**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- * - BOTTOM

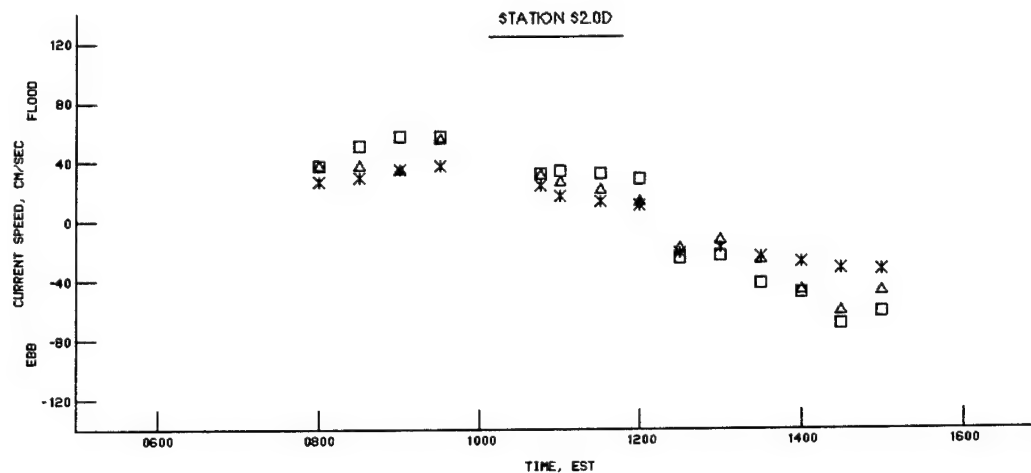
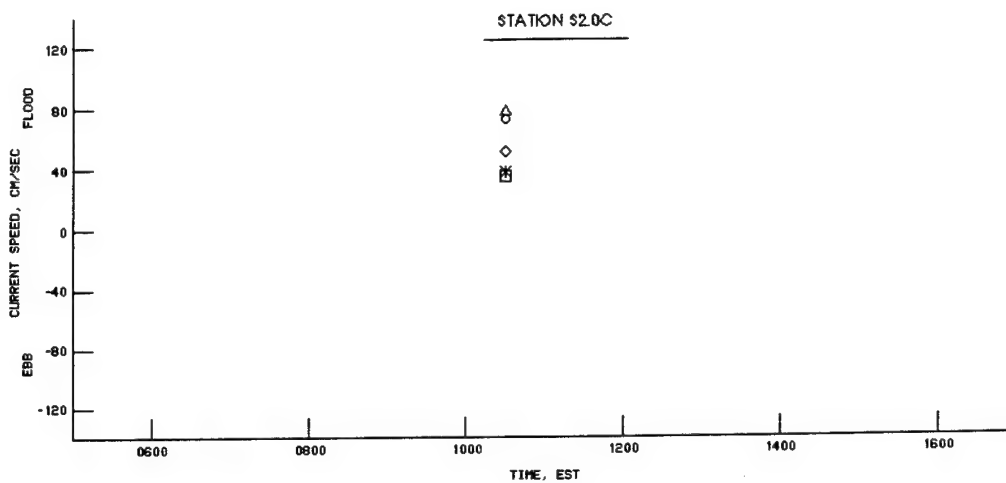
**CURRENT SPEED
STATIONS S2.0C AND S2.0D
04/24/93**



LEGEND

- - SURFACE
- △ - MIDDEPTH
- ✱ - BOTTOM

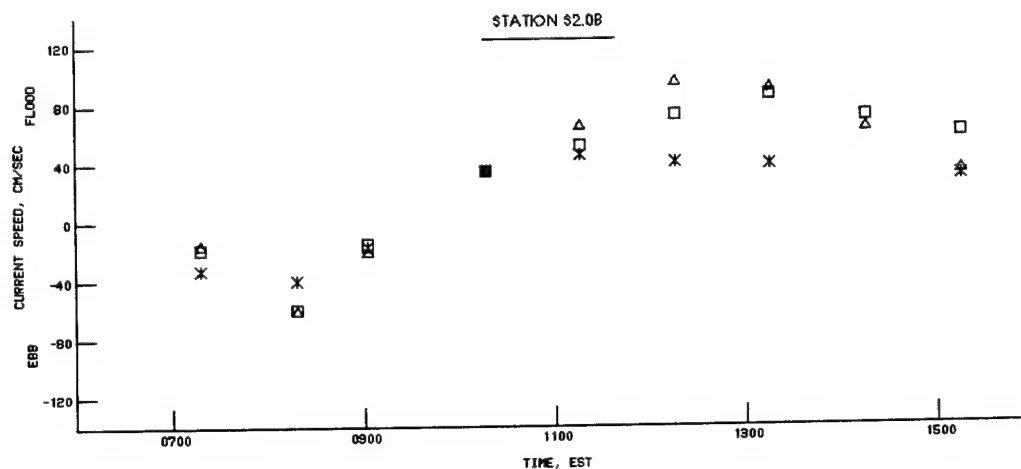
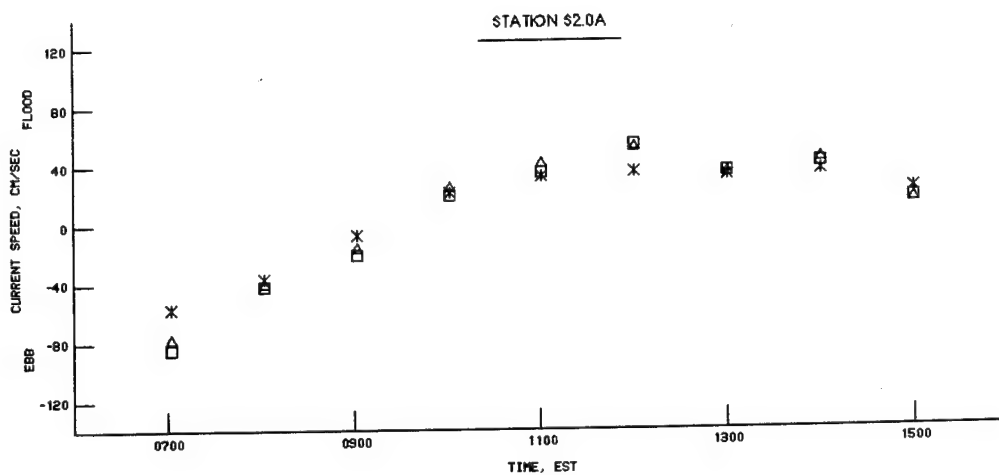
**CURRENT SPEED
STATIONS S2.0A AND S2.0B
04/25/93**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- ✕ - BOTTOM

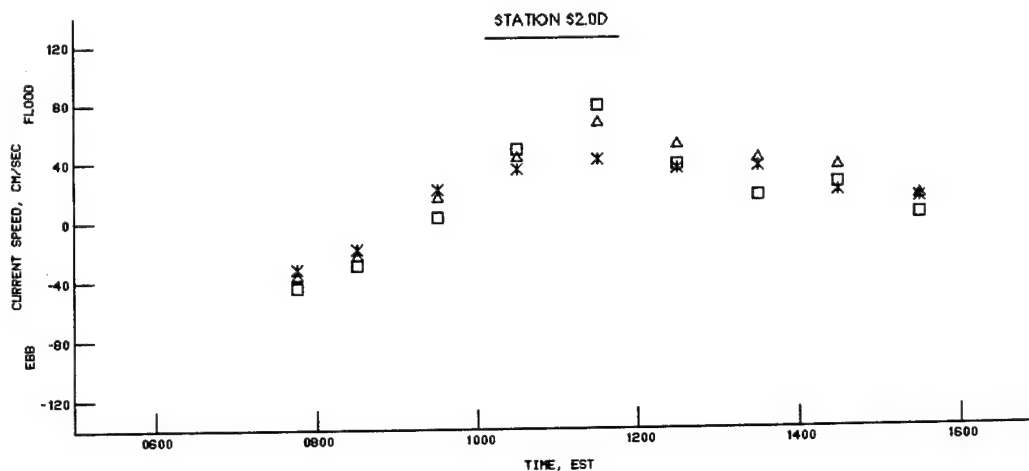
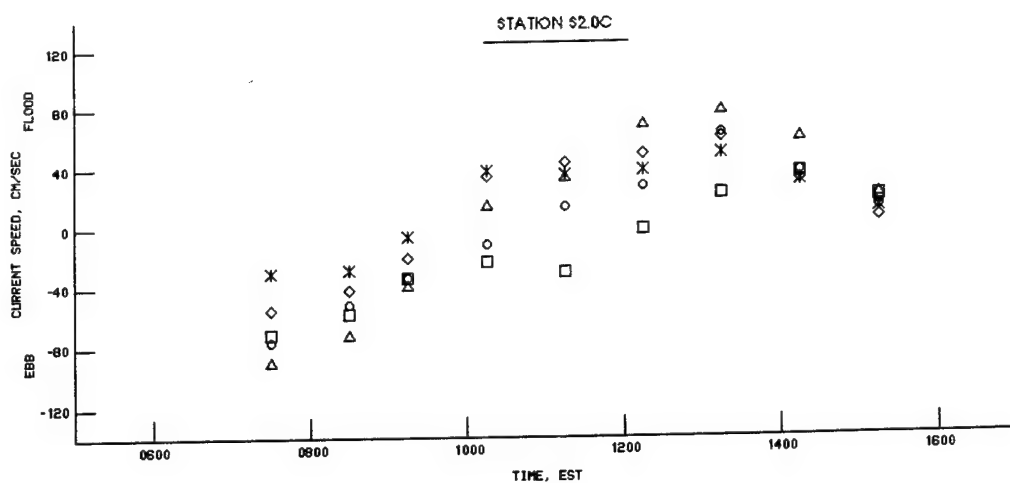
**CURRENT SPEED
STATIONS S2.0C AND S2.0D
04/25/93**



LEGEND

- - SURFACE
- △ - MIDDEPTH
- × - BOTTOM

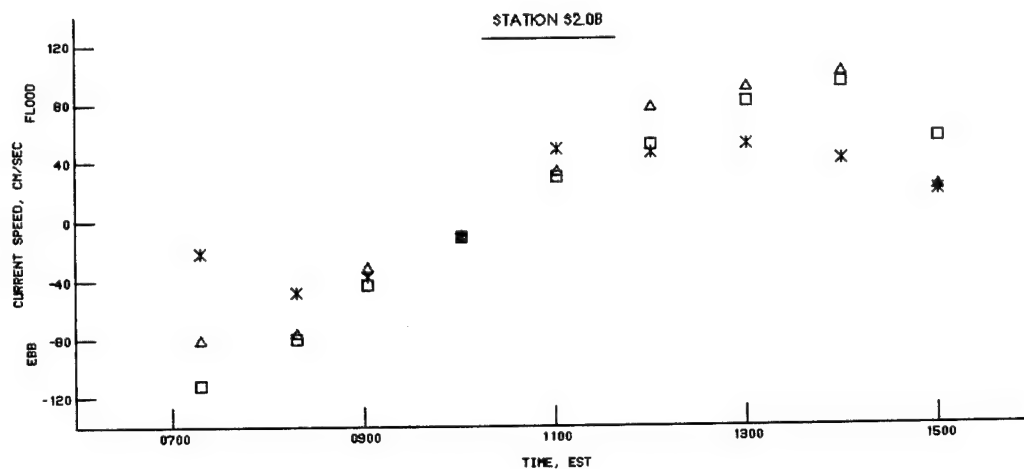
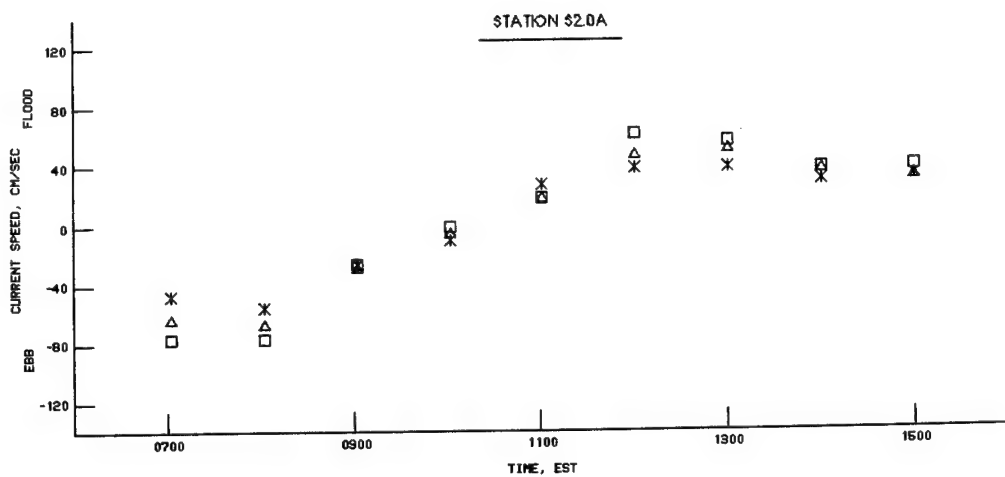
**CURRENT SPEED
STATIONS S2.0A AND S2.0B
04/28/93**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- * - BOTTOM

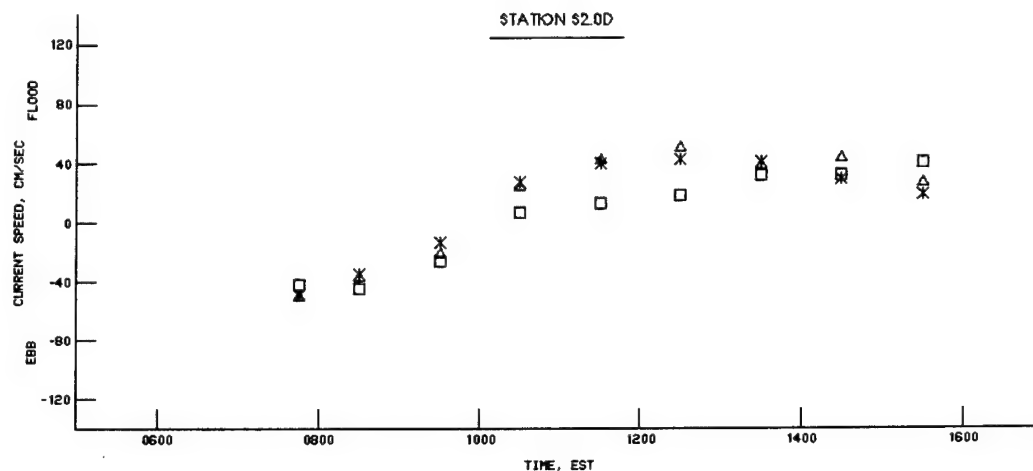
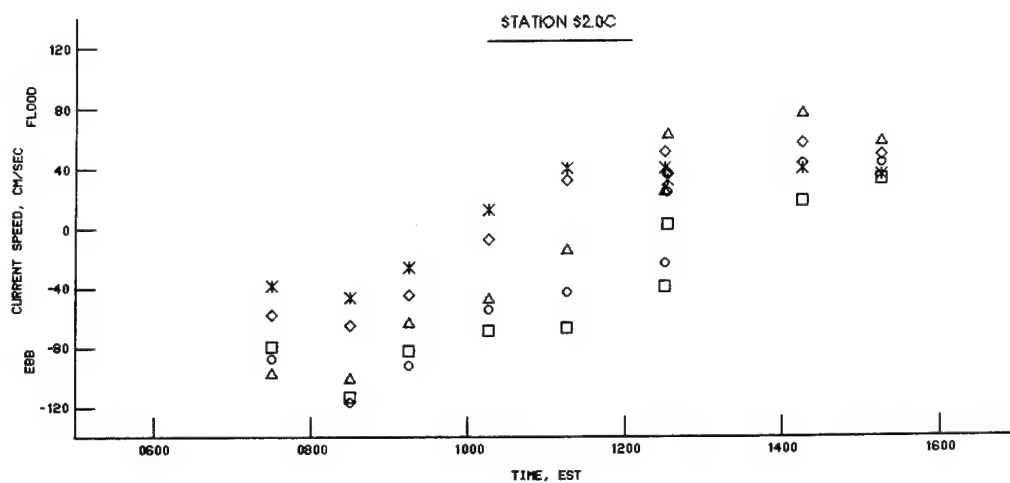
**CURRENT SPEED
STATIONS S2.0C AND S2.0D
04/28/93**



LEGEND

- - SURFACE
- △ - MIDDEPTH
- × - BOTTOM

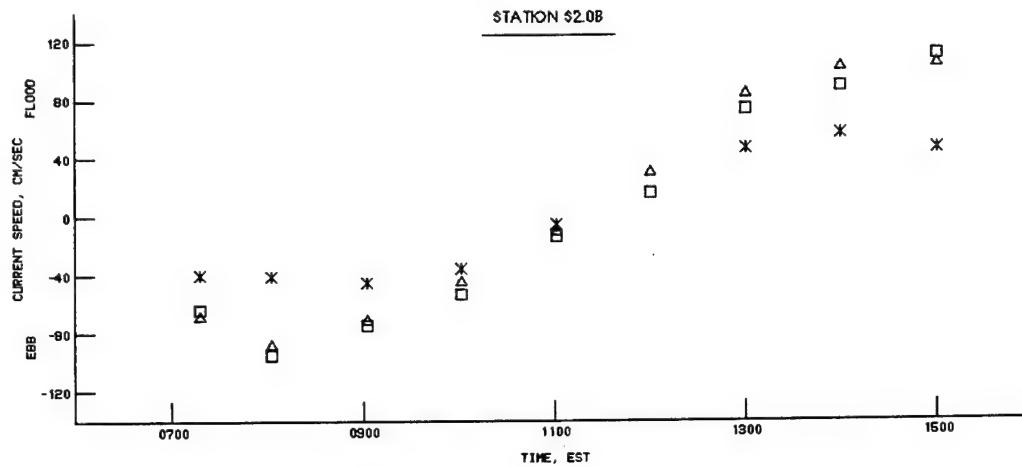
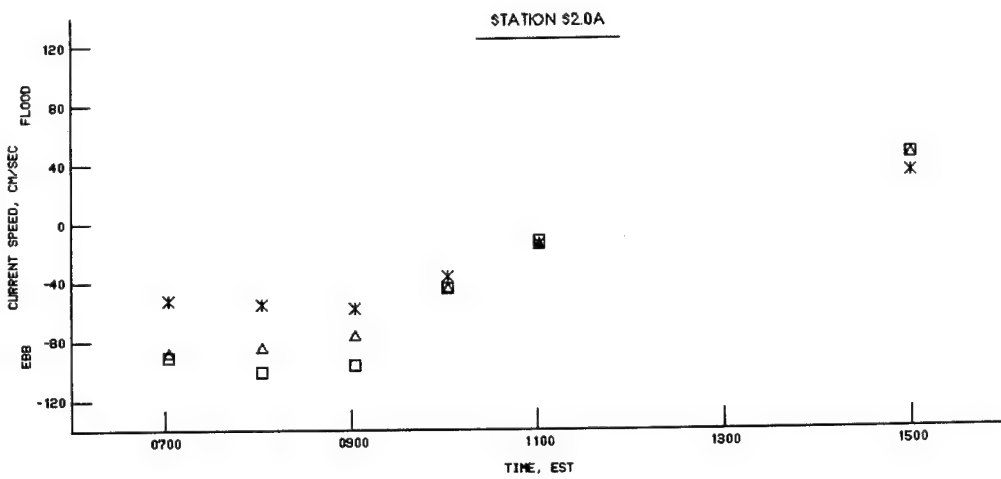
**CURRENT SPEED
STATIONS S2.0A AND S2.0B
04/29/93**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- * - BOTTOM

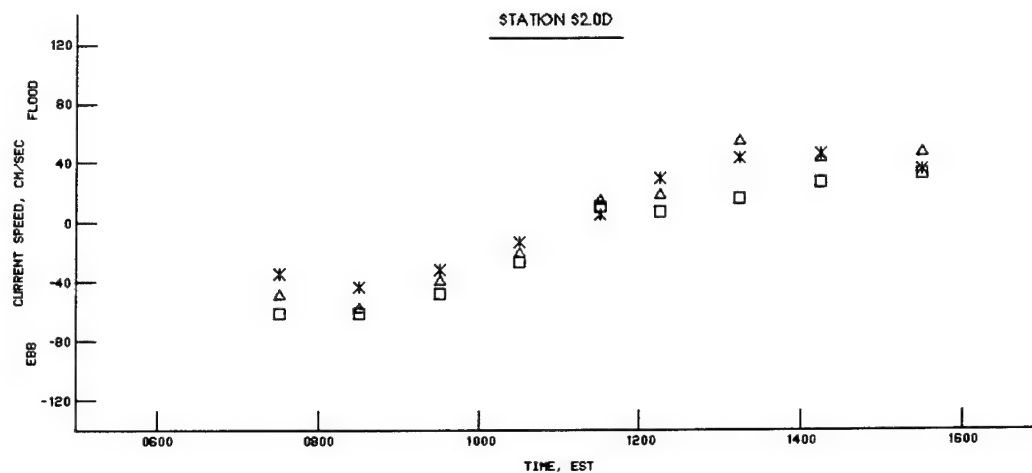
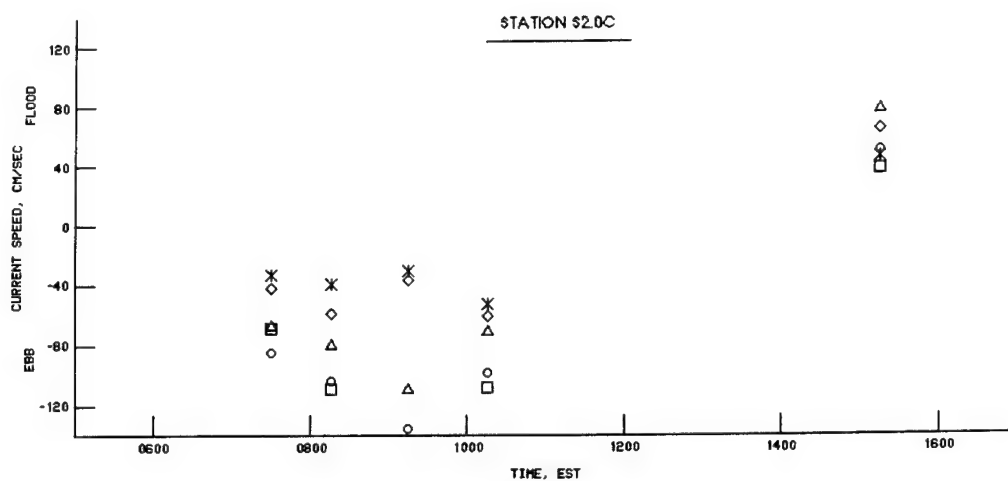
**CURRENT SPEED
STATIONS S2.0C AND S2.0D
04/29/93**



LEGEND

- - SURFACE
- △ - MIDDEPTH
- × - BOTTOM

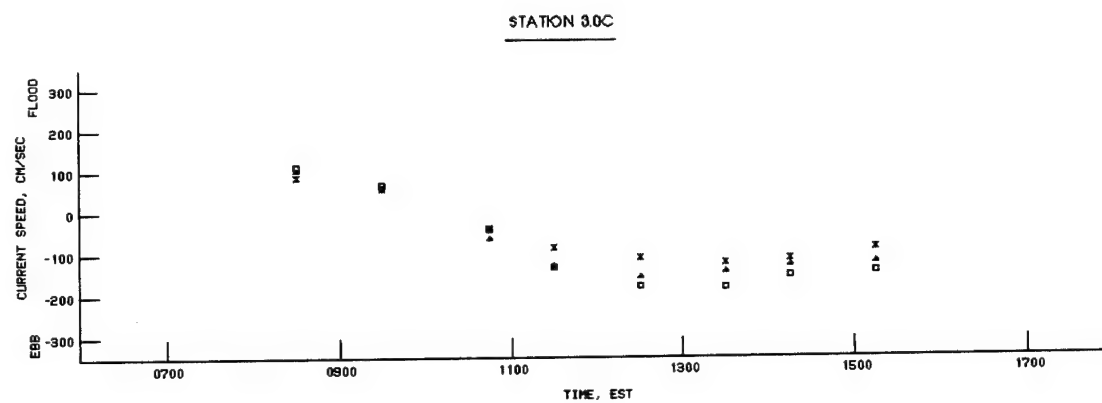
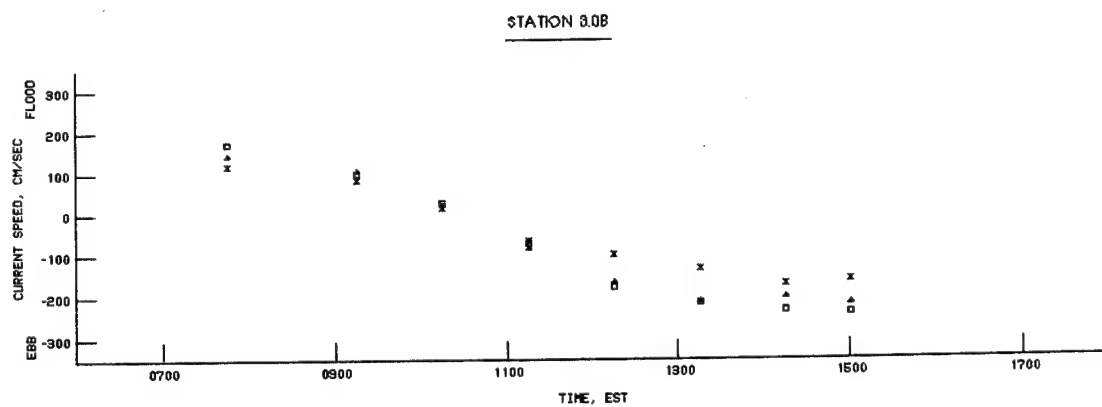
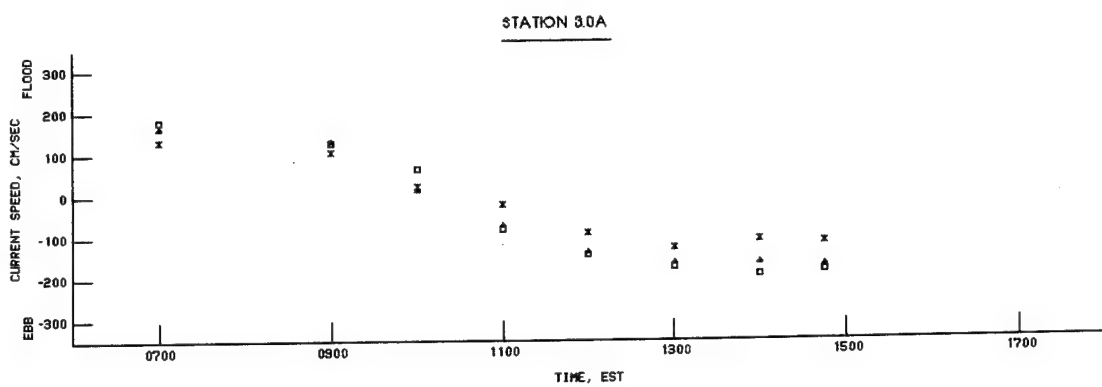
**CURRENT SPEED
STATIONS S2.0A AND S2.0B
04/30/93**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- ✕ - BOTTOM

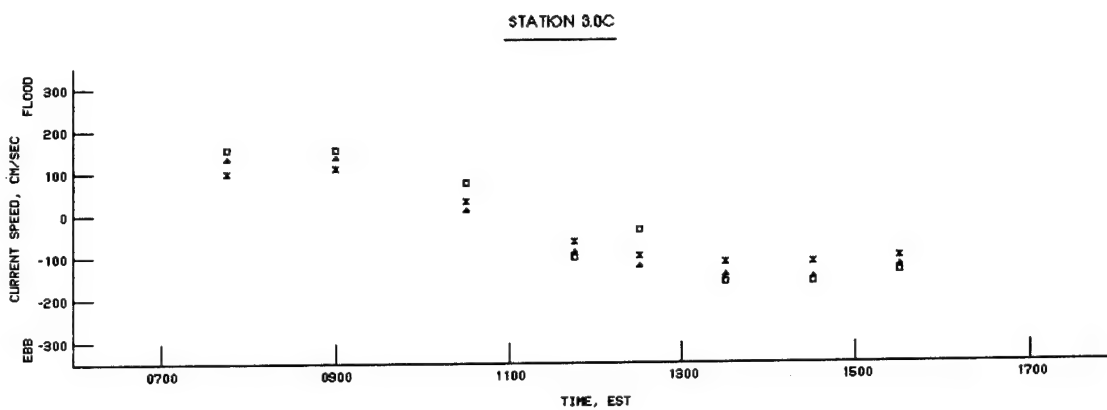
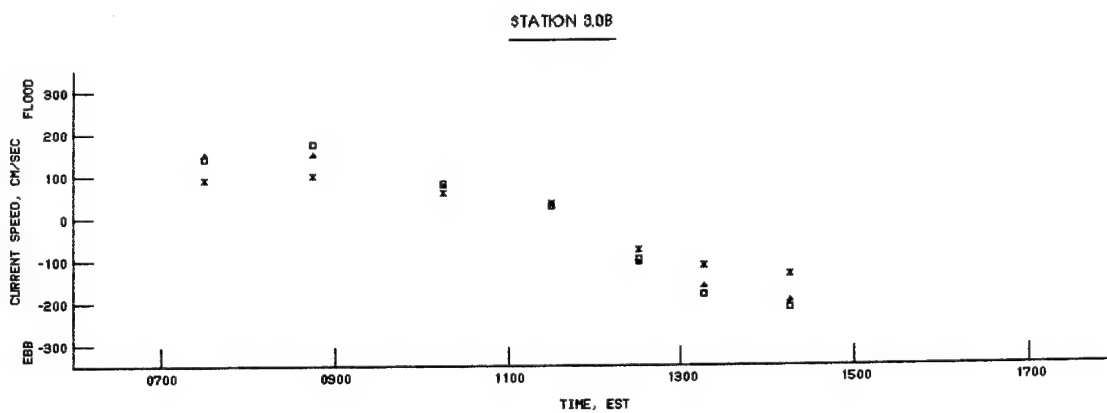
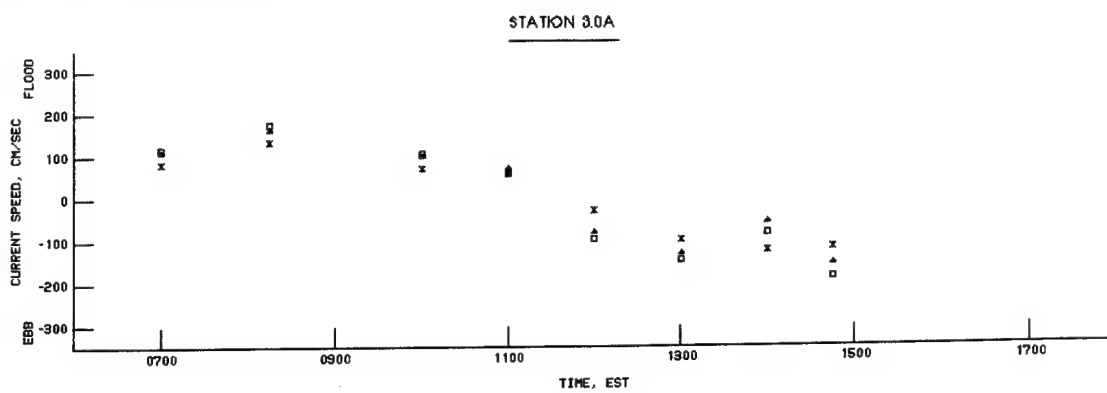
**CURRENT SPEED
STATIONS S2.0C AND S2.0D
04/30/93**



LEGEND

□ - SURFACE
 △ - MIDDEPTH
 × - BOTTOM

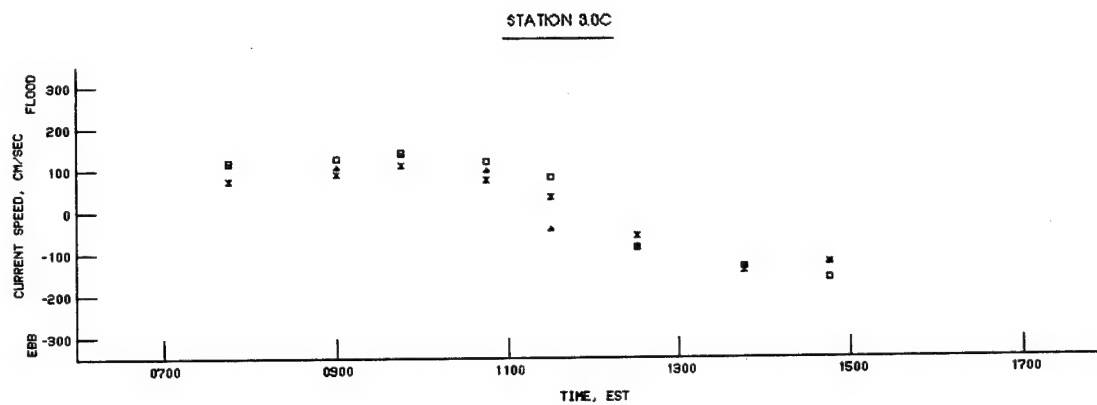
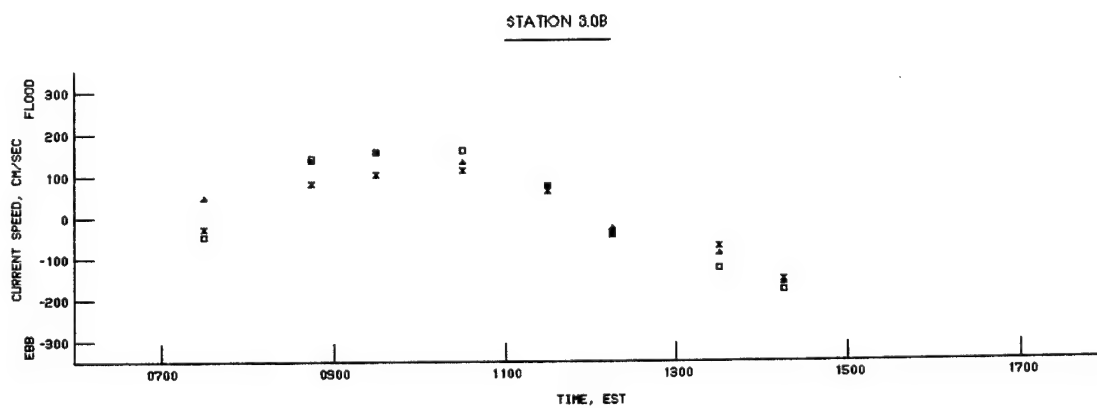
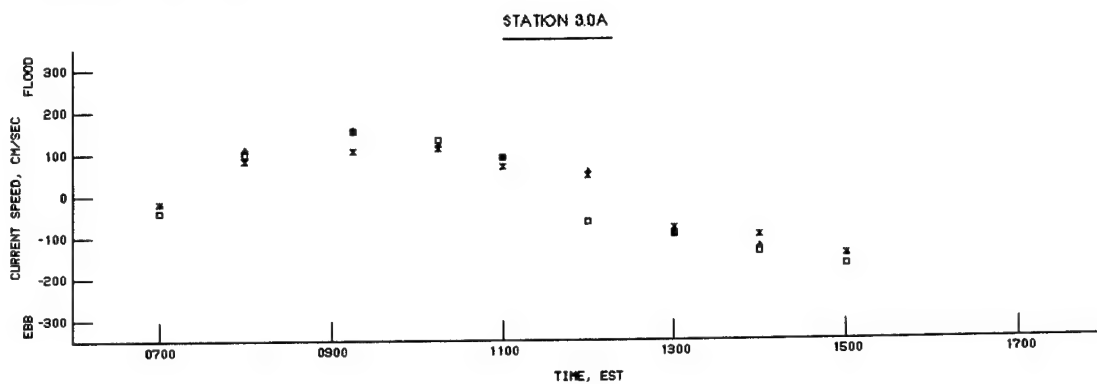
CURRENT SPEED
STATIONS S3.0A, S3.0B, AND S3.0C
04/19/93



LEGEND

□ - SURFACE
 △ - MIDDEPTH
 × - BOTTOM

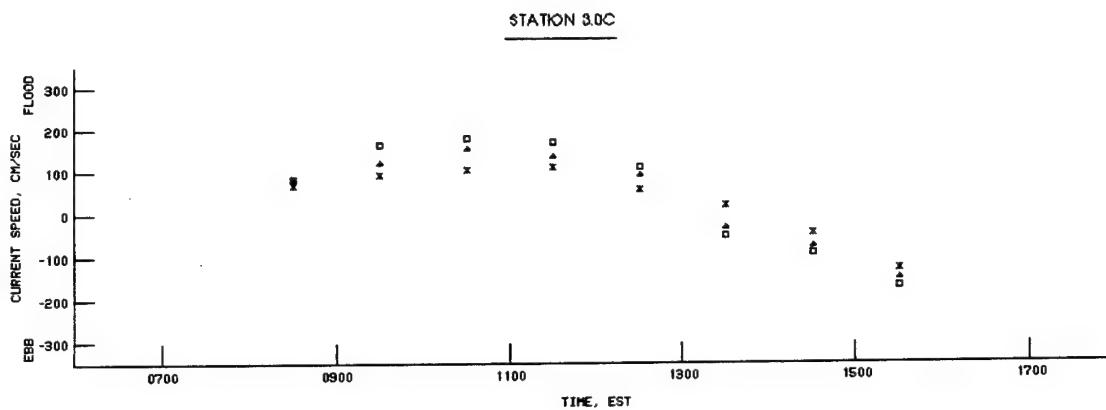
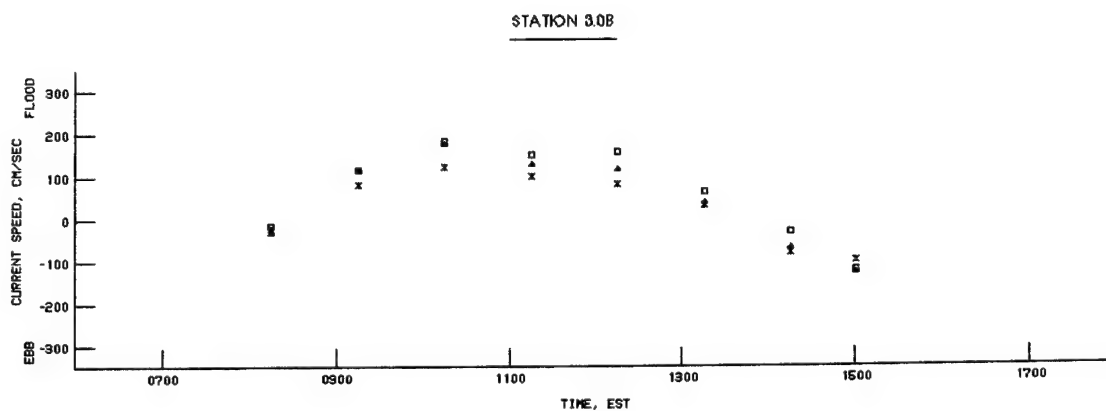
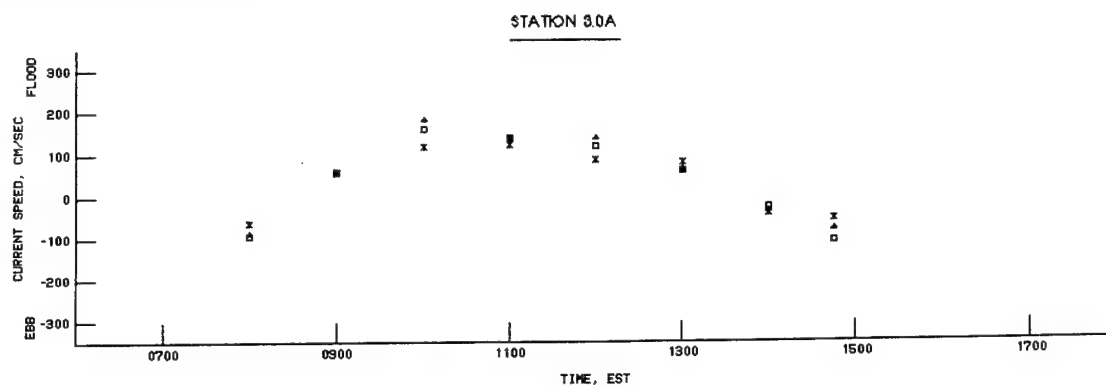
**CURRENT SPEED
 STATIONS S3.0A, S3.0B, AND S3.0C
 04/20/93**



LEGEND

□ - SURFACE
 △ - MIDDEPTH
 ✕ - BOTTOM

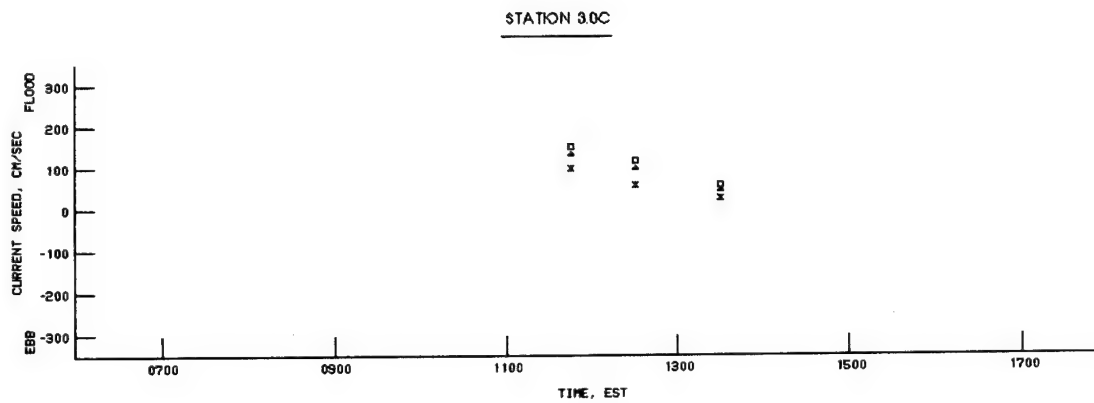
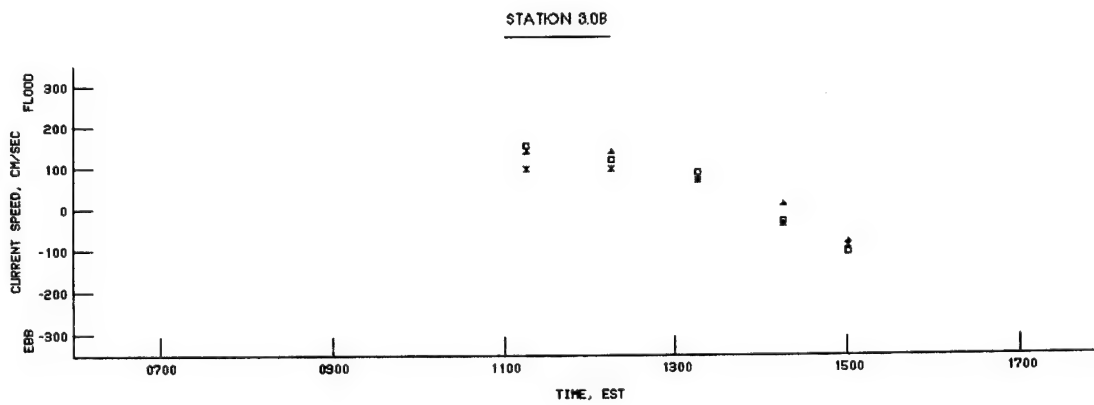
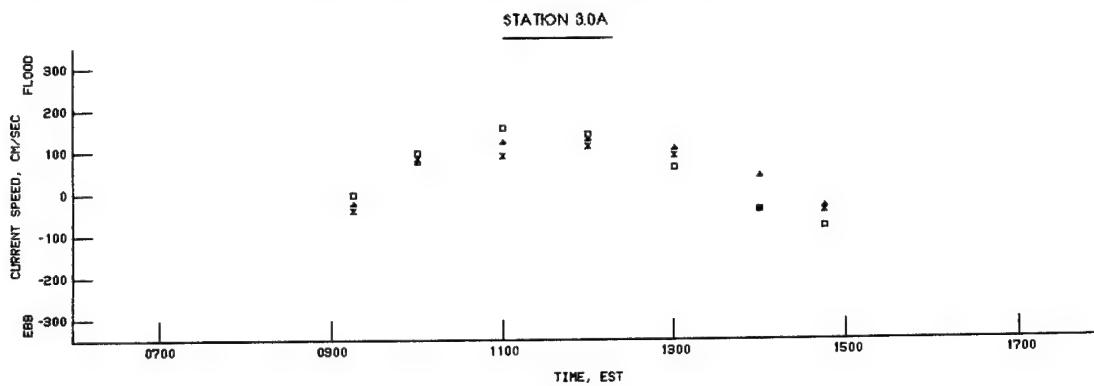
**CURRENT SPEED
 STATIONS S3.0A, S3.0B, AND S3.0C
 04/22/93**



LEGEND

□ - SURFACE
 △ - MIDDEPTH
 ✕ - BOTTOM

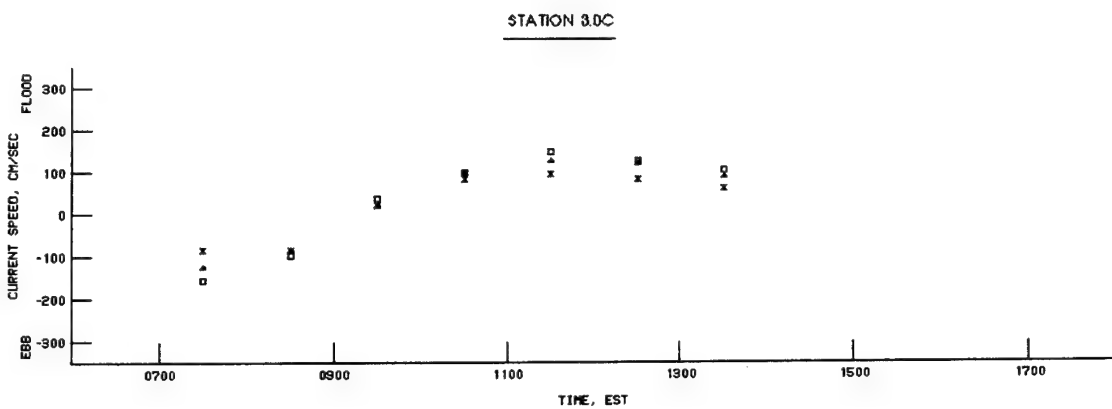
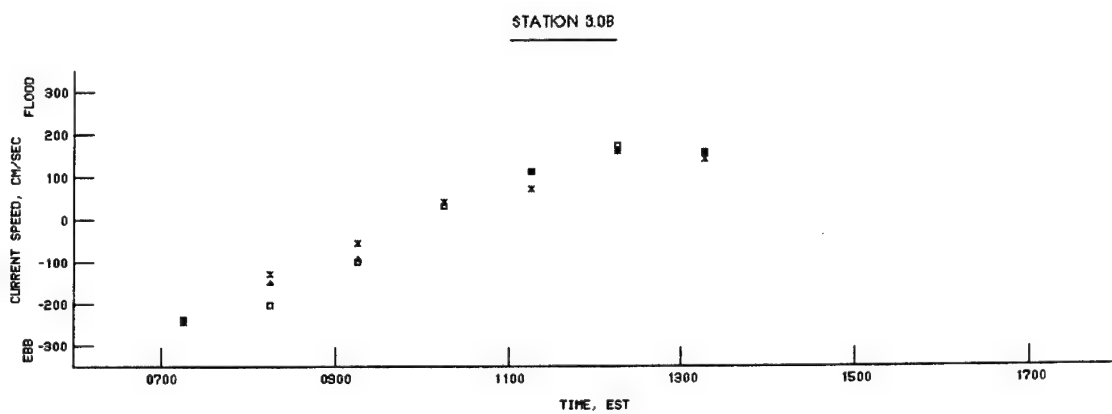
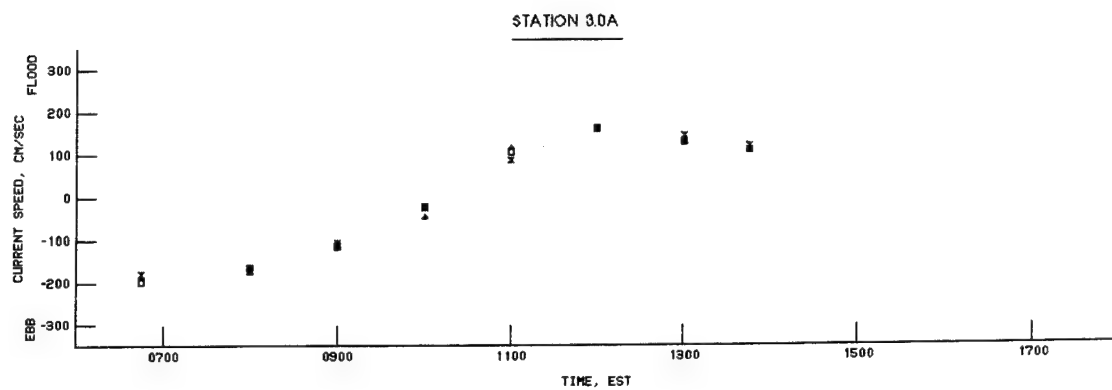
**CURRENT SPEED
 STATIONS S3.0A, S3.0B, AND S3.0C
 04/24/93**



LEGEND

□ - SURFACE
 △ - MIDDEPTH
 * - BOTTOM

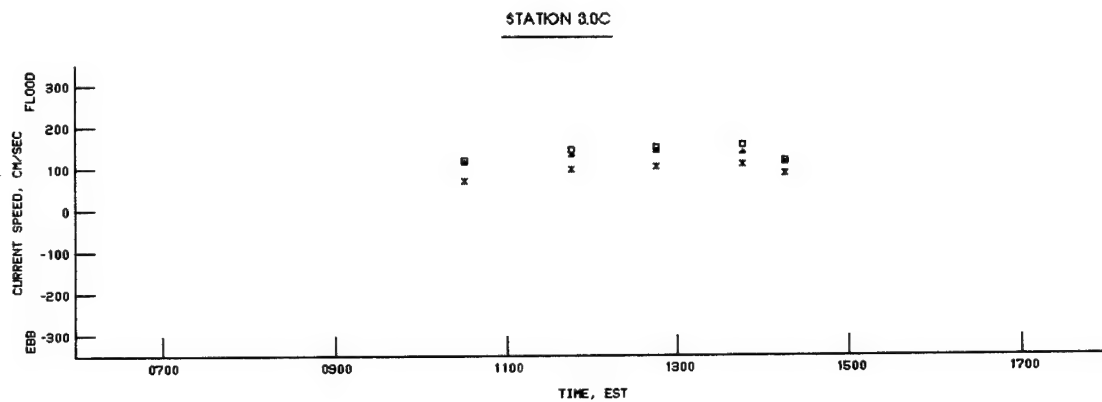
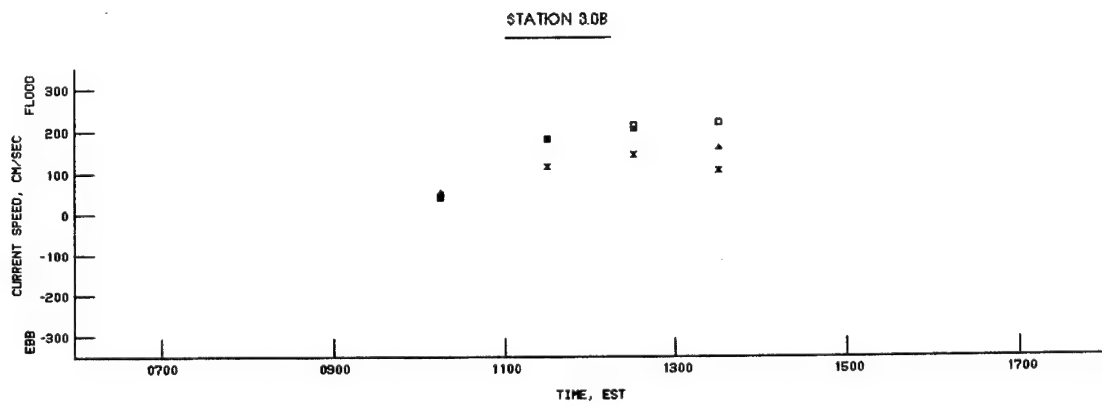
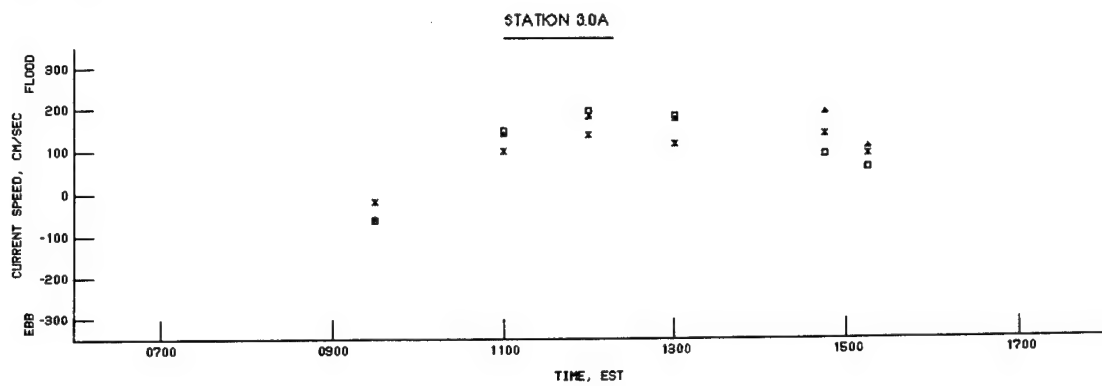
CURRENT SPEED
STATIONS S3.0A, S3.0B, AND S3.0C
04/25/93



LEGEND

□ - SURFACE
 △ - MIDDEPTH
 * - BOTTOM

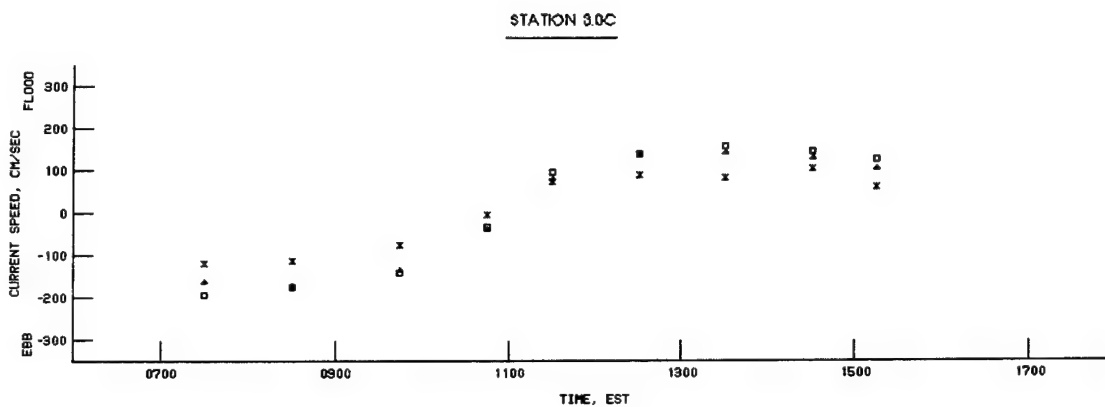
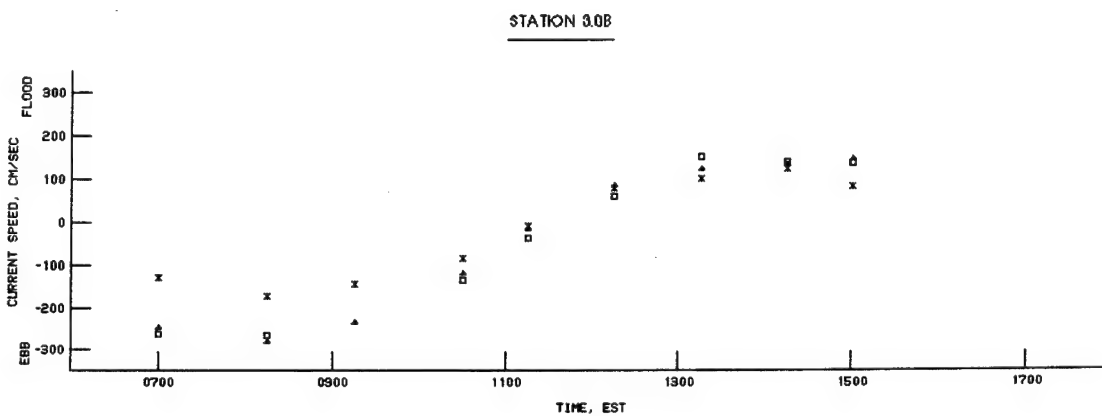
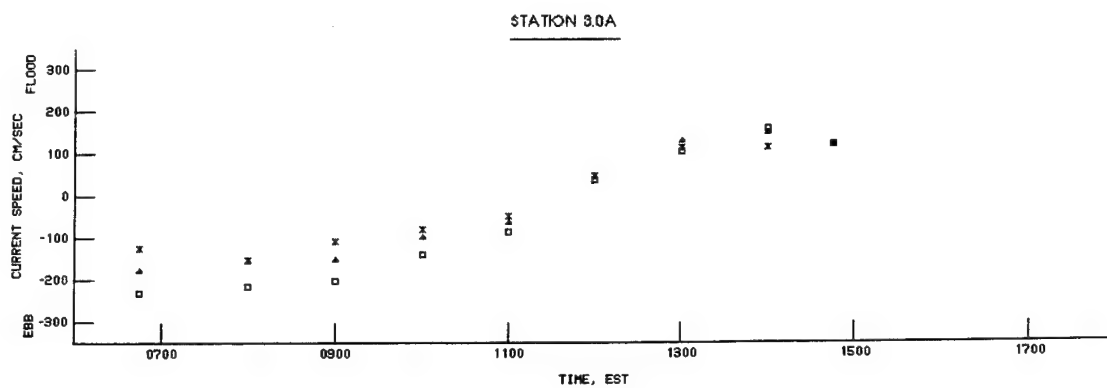
**CURRENT SPEED
 STATIONS S3.0A, S3.0B, AND S3.0C
 04/26/93**



LEGEND

- - SURFACE
- △ - MIDDEPTH
- × - BOTTOM

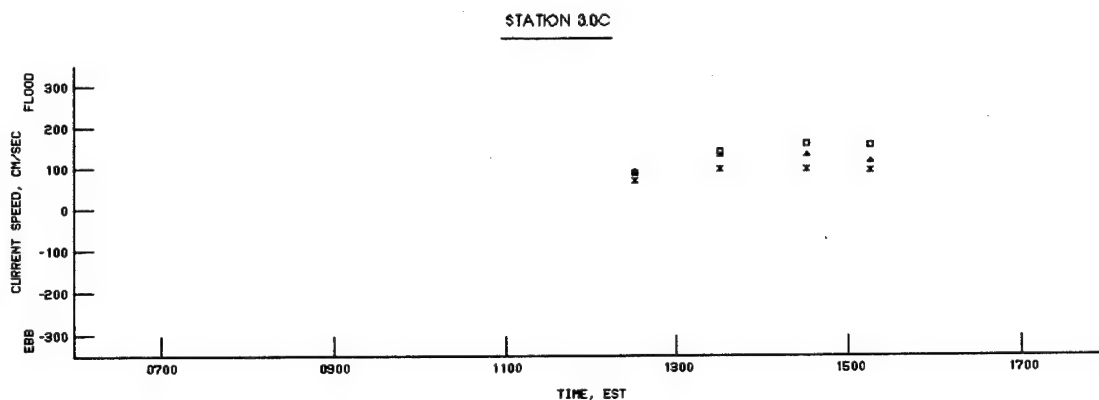
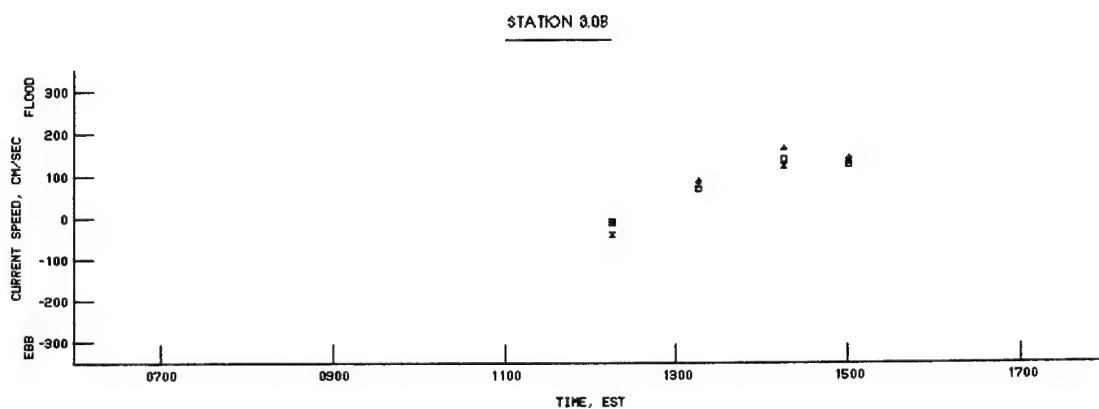
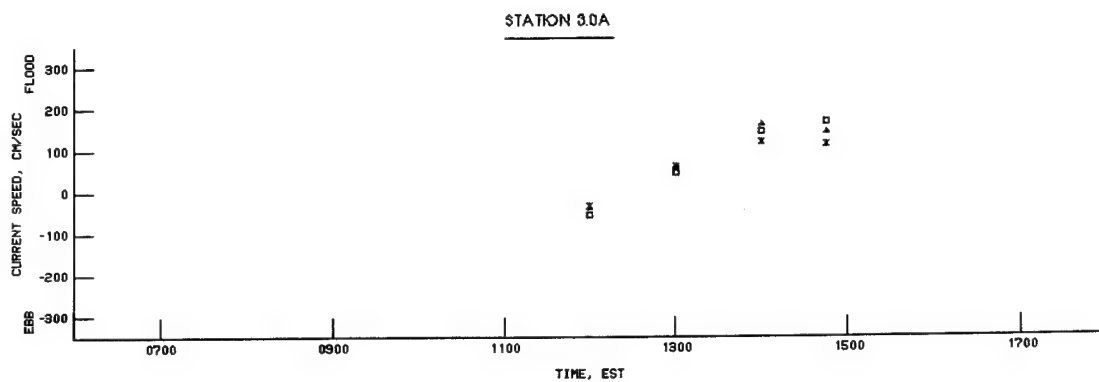
**CURRENT SPEED
STATIONS S3.0A, S3.0B, AND S3.0C
04/27/93**



LEGEND

- - SURFACE
- △ - MIDDDEPTH
- * - BOTTOM

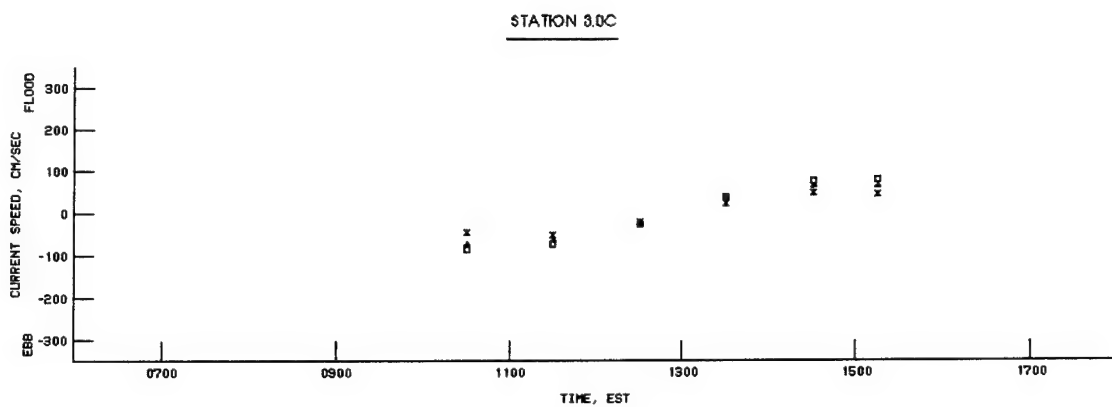
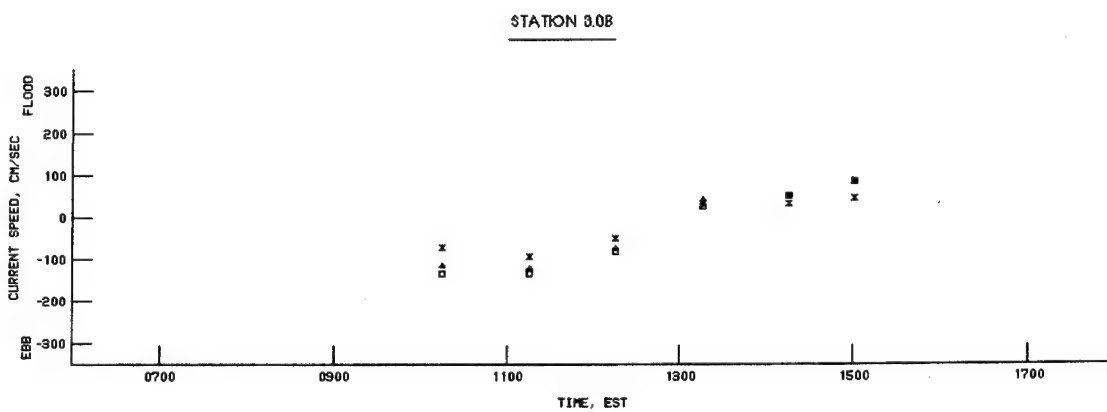
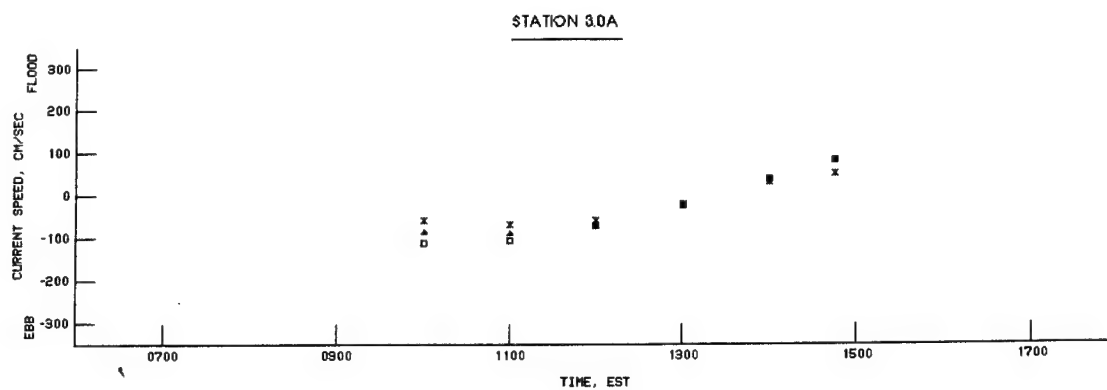
**CURRENT SPEED
STATIONS S3.0A, S3.0B, AND S3.0C
04/28/93**



LEGEND

□ - SURFACE
 △ - MIDDEPTH
 ✕ - BOTTOM

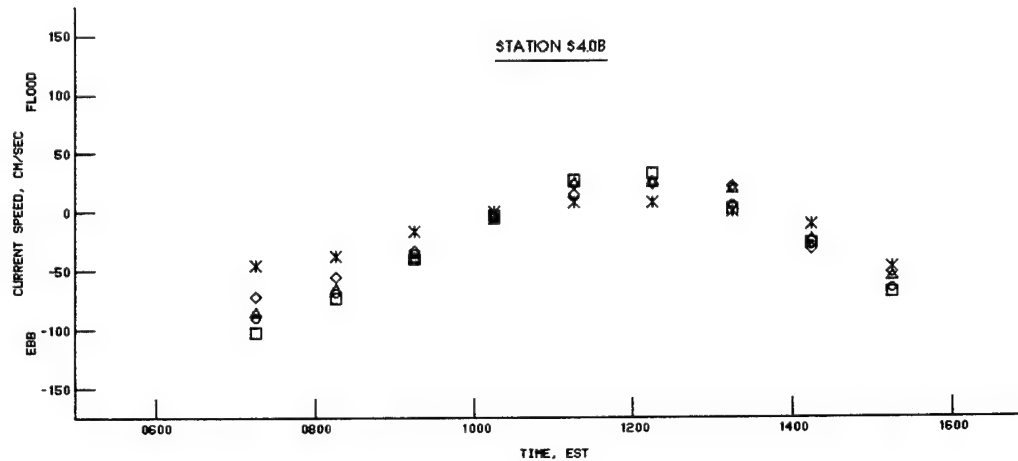
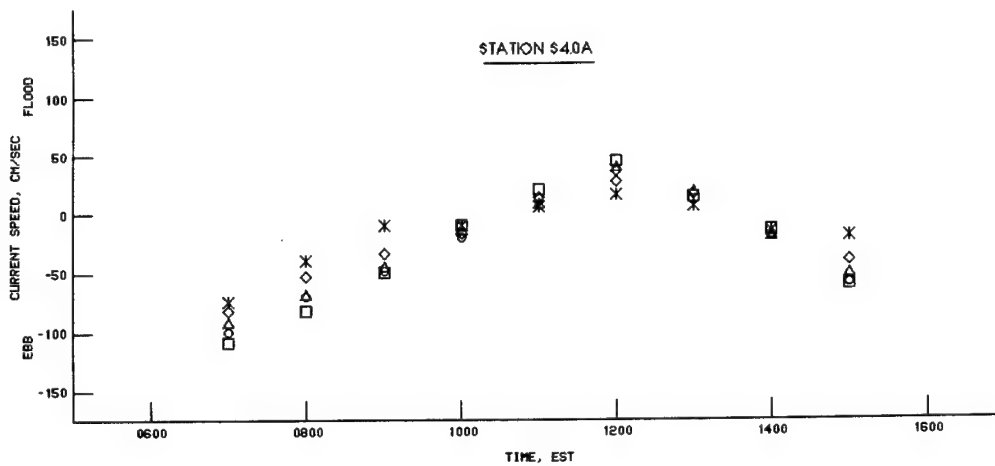
CURRENT SPEED
STATIONS S3.0A, S3.0B, AND S3.0C
04/29/93



LEGEND

□ - SURFACE
 △ - MIDDEPTH
 ✕ - BOTTOM

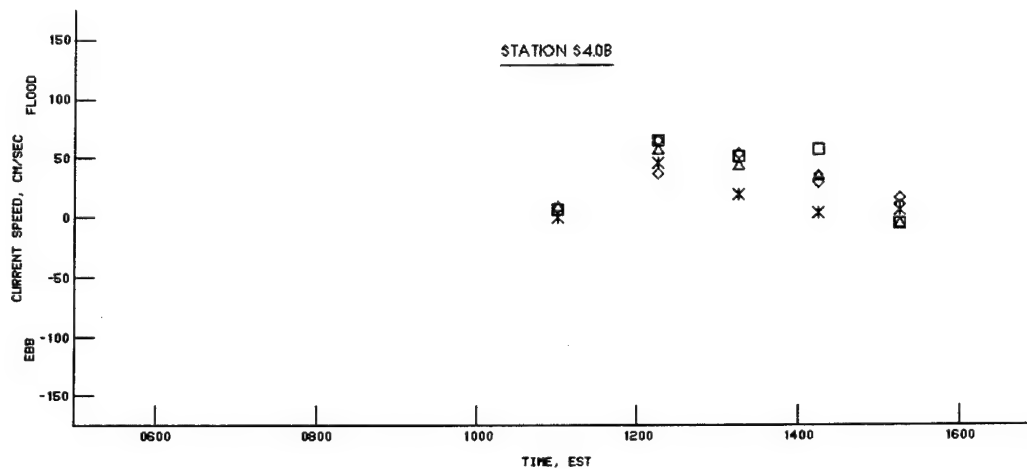
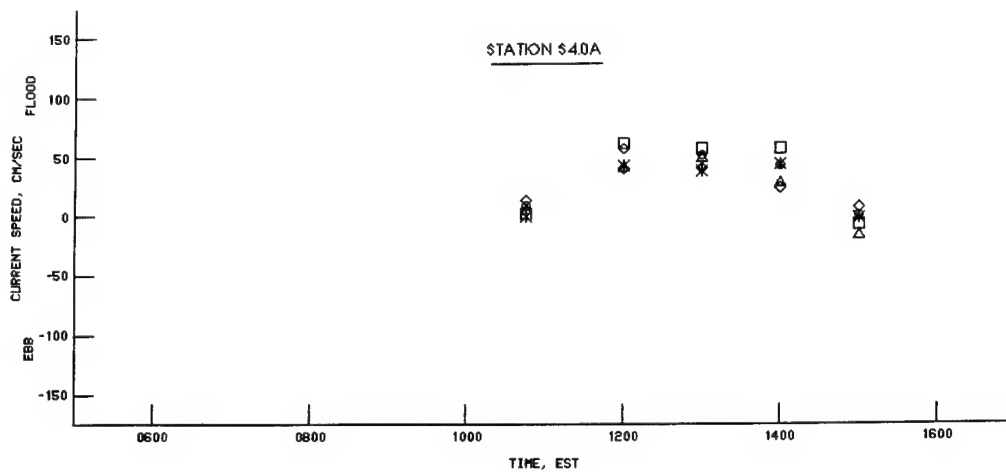
CURRENT SPEED
STATIONS S3.0A, S3.0B, AND S3.0C
04/30/93



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- * - BOTTOM

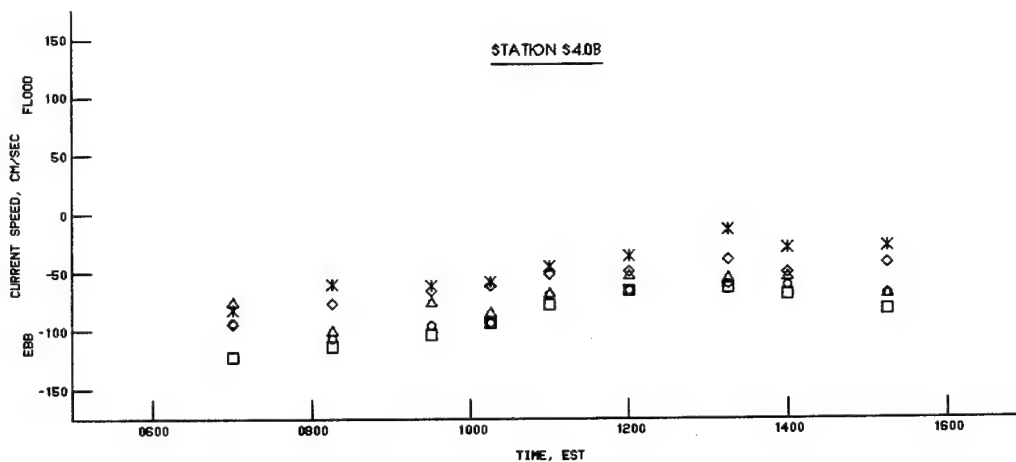
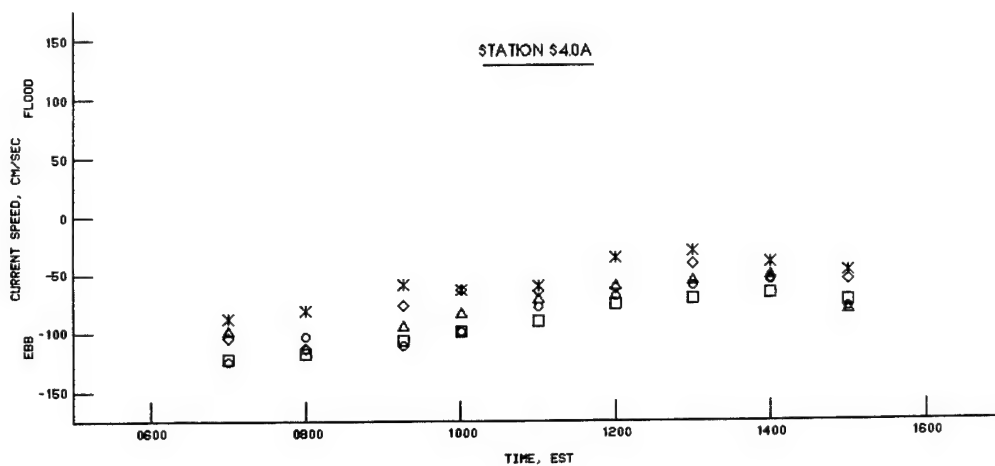
**CURRENT SPEED
STATIONS S4.0A AND S4.0B
04/20/93**



LEGEND

| | |
|---|-----------------------|
| □ | - SURFACE |
| ○ | - ONE-QUARTER DEPTH |
| △ | - MIDDEPTH |
| ◇ | - THREE-QUARTER DEPTH |
| ✱ | - BOTTOM |

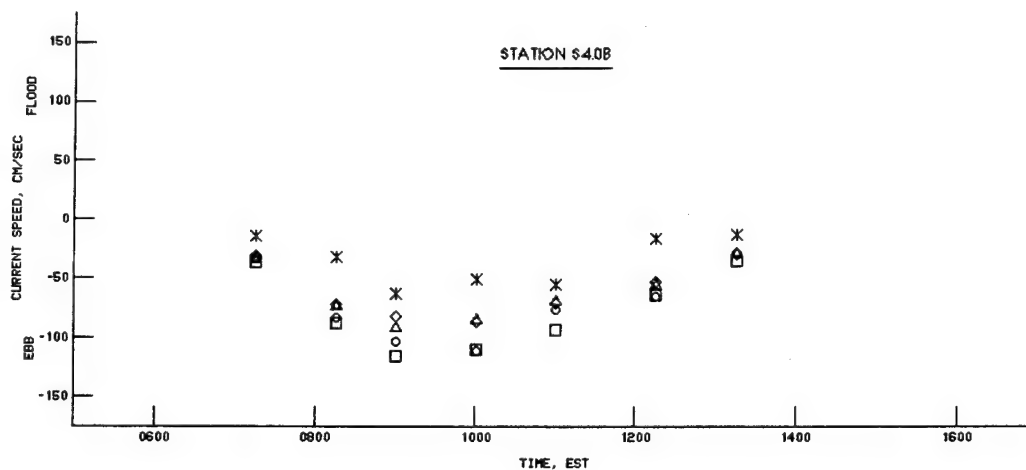
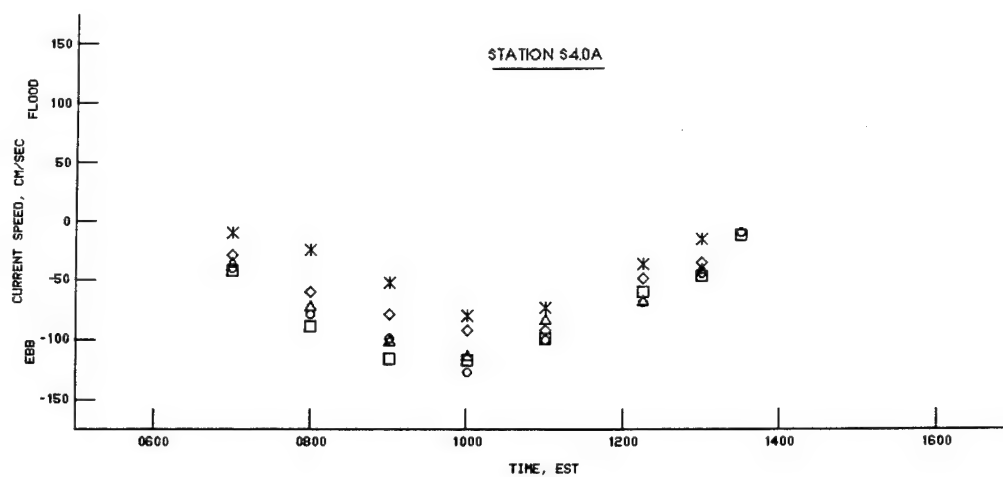
**CURRENT SPEED
STATIONS S4.0A AND S4.0B
04/22/93**



LEGEND

| | |
|---|-----------------------|
| □ | - SURFACE |
| ○ | - ONE-QUARTER DEPTH |
| △ | - MIDDEPTH |
| ◇ | - THREE-QUARTER DEPTH |
| * | - BOTTOM |

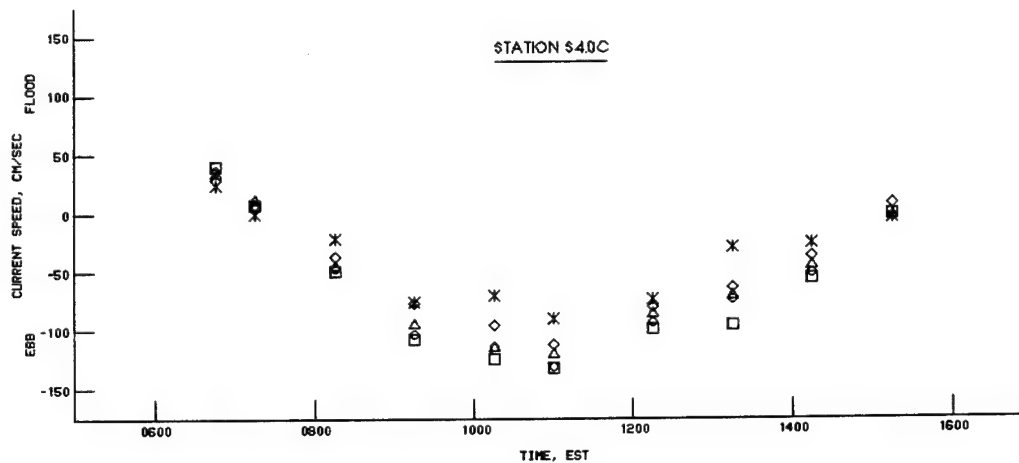
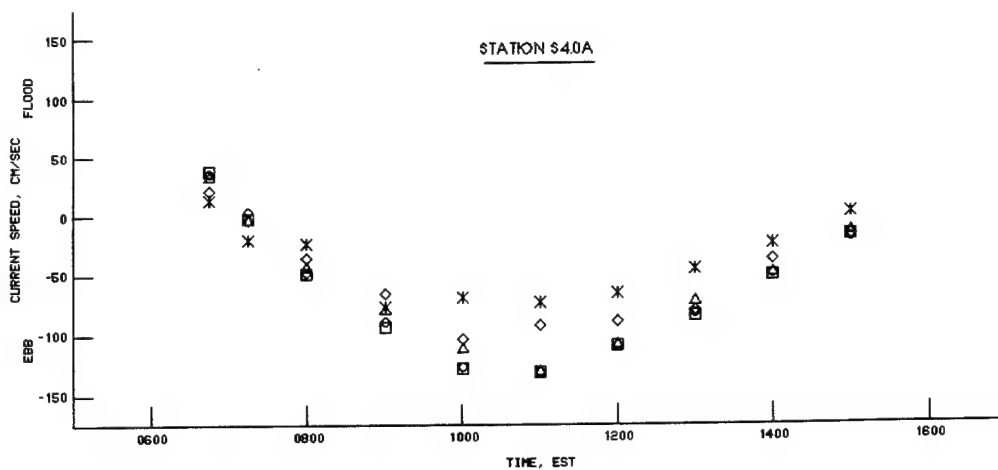
**CURRENT SPEED
STATIONS S4.0A AND S4.0B
04/23/93**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- * - BOTTOM

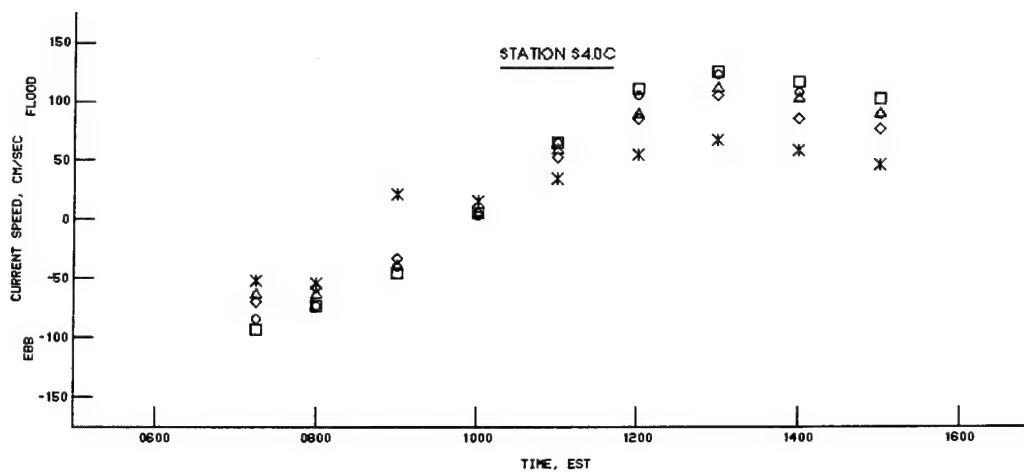
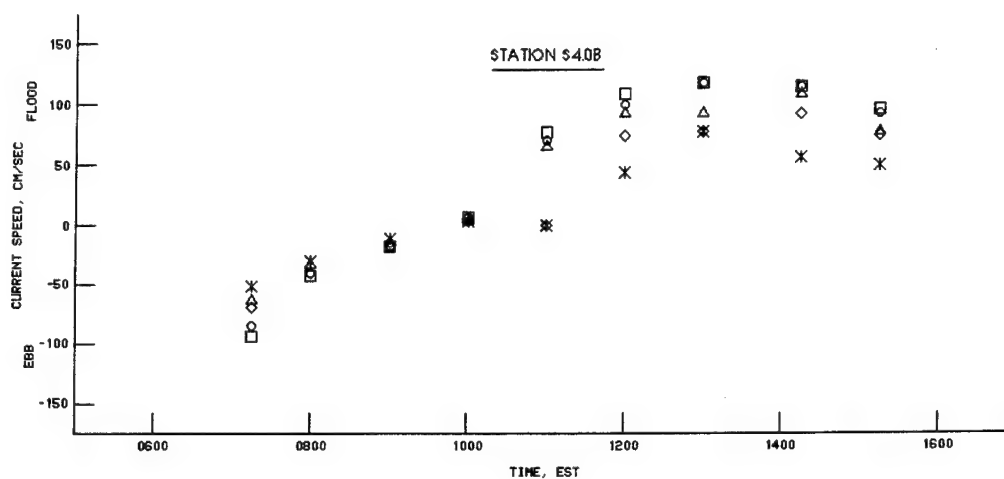
**CURRENT SPEED
STATIONS S4.0A AND S4.0B
04/26/93**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- * - BOTTOM

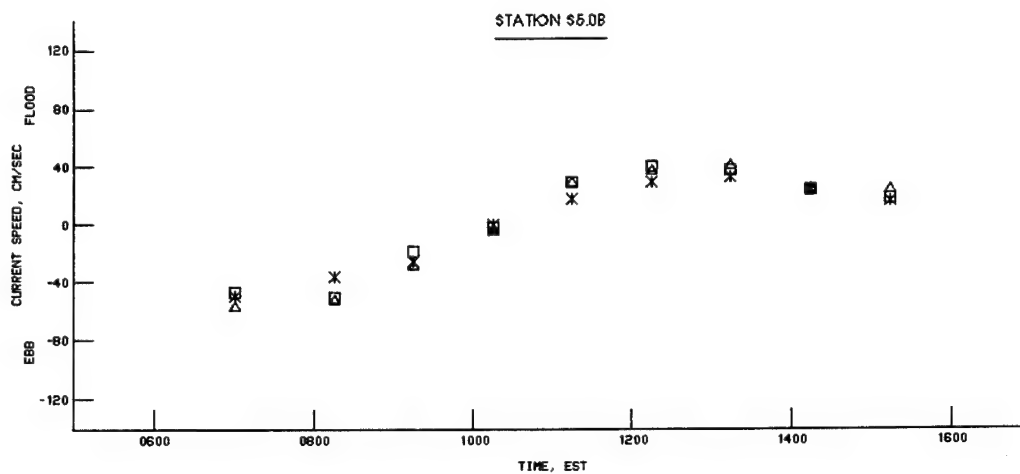
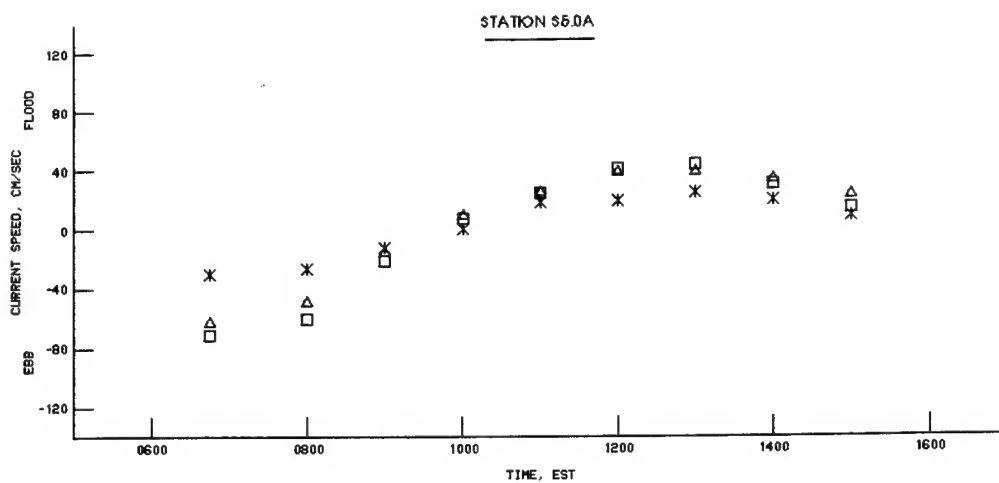
**CURRENT SPEED
STATIONS S4.0A AND S4.0C
04/28/93**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- * - BOTTOM

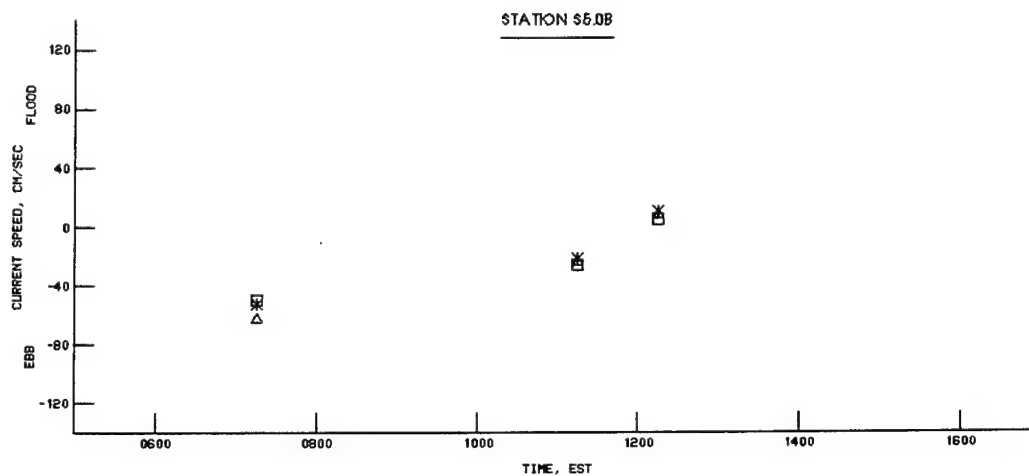
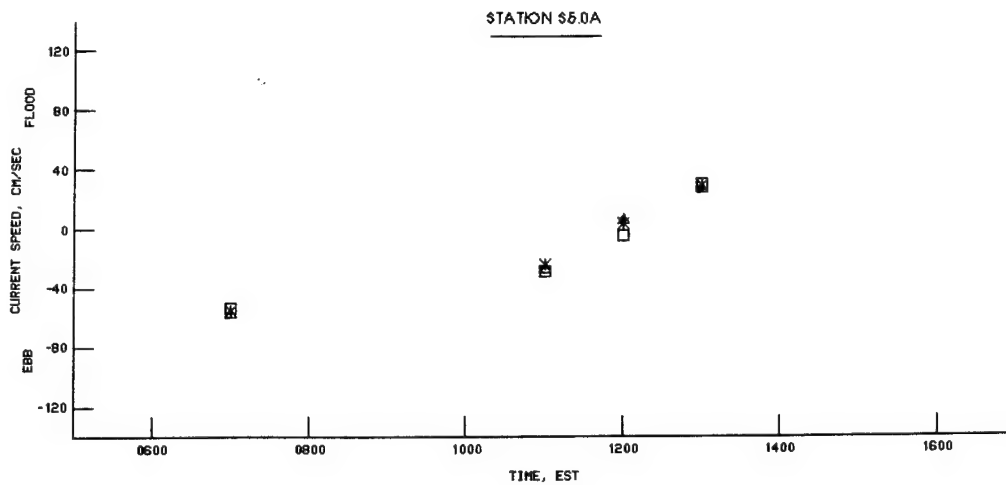
**CURRENT SPEED
STATIONS S4.0B AND S4.0C
04/30/93**



LEGEND

| | |
|---|-------------|
| □ | - SURFACE |
| △ | - MIDDDEPTH |
| * | - BOTTOM |

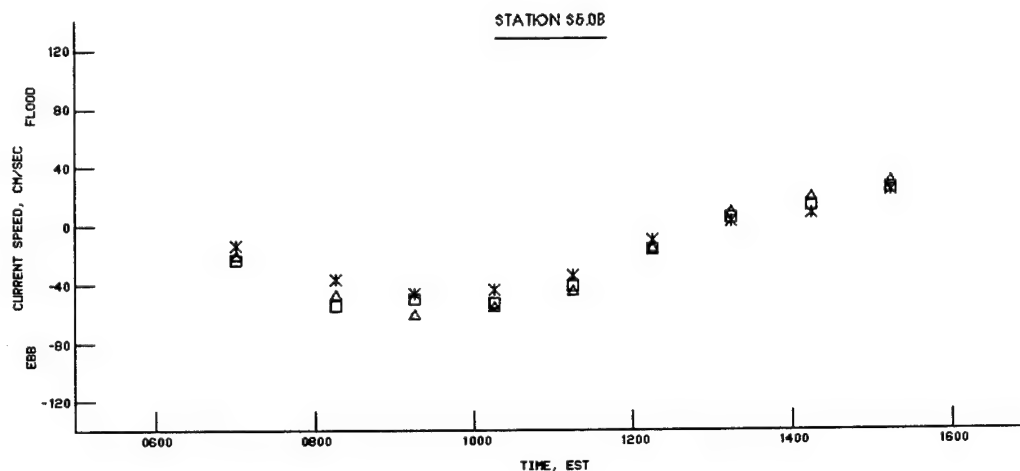
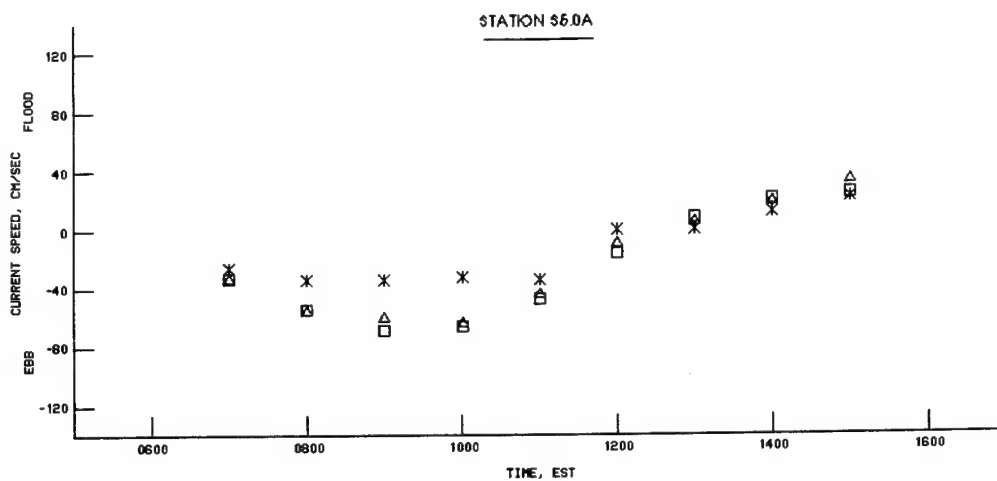
**CURRENT SPEED
STATIONS S5.0A AND S5.0B
04/21/93**



LEGEND

- - SURFACE
- △ - MIDDEPTH
- × - BOTTOM

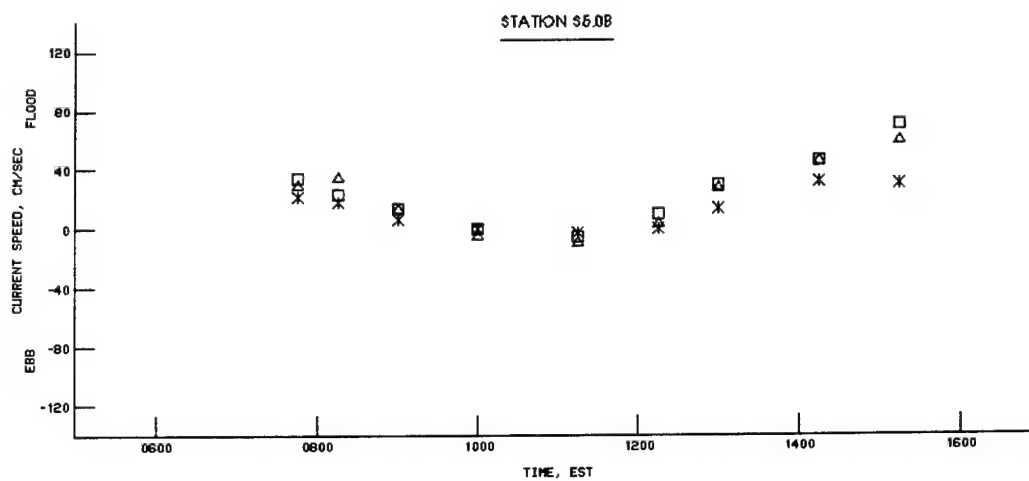
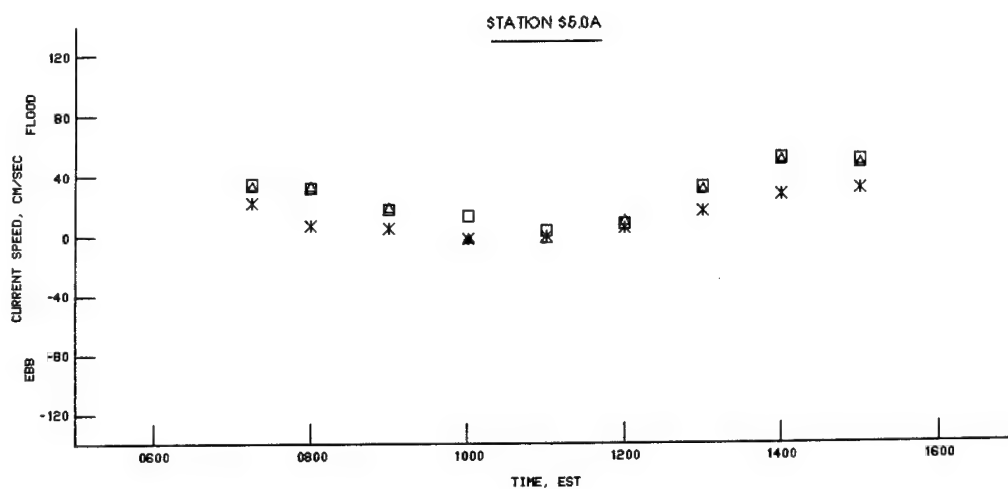
**CURRENT SPEED
STATIONS S5.0A AND S5.0B
04/24/93**



LEGEND

- - SURFACE
- △ - MIDDLEDEPTH
- × - BOTTOM

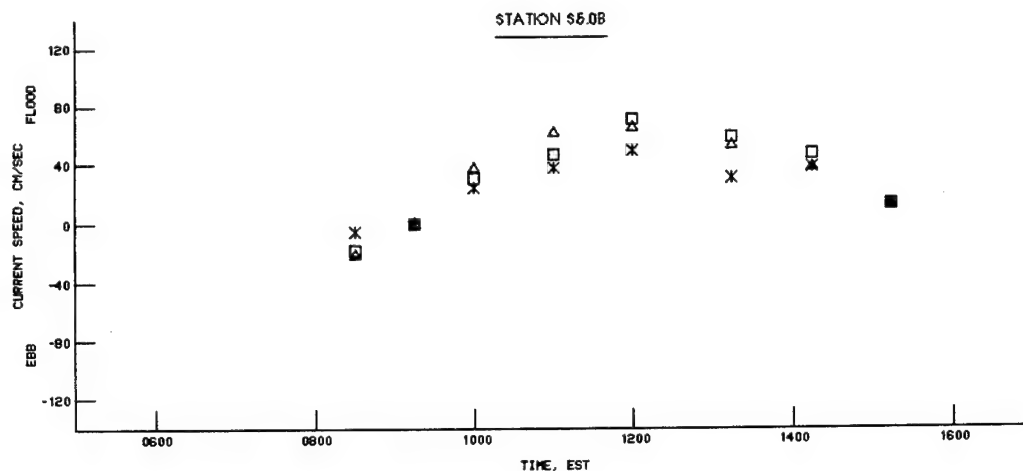
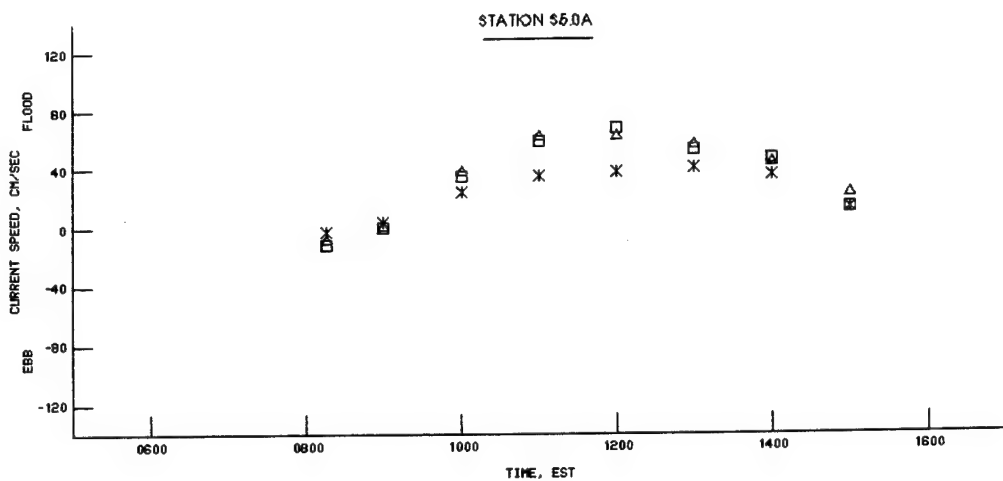
**CURRENT SPEED
STATIONS S5.0A AND S5.0B
04/25/93**



LEGEND

| | |
|---|---------------|
| □ | - SURFACE |
| △ | - MIDDLEDEPTH |
| × | - BOTTOM |

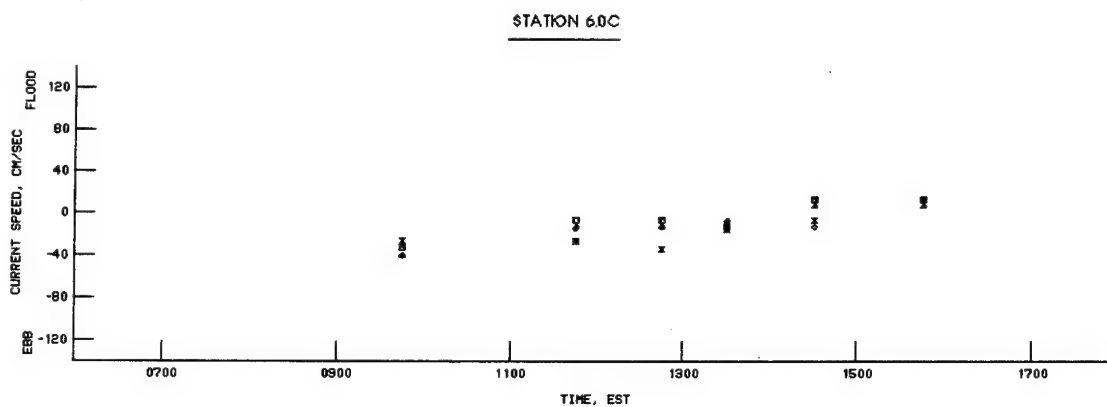
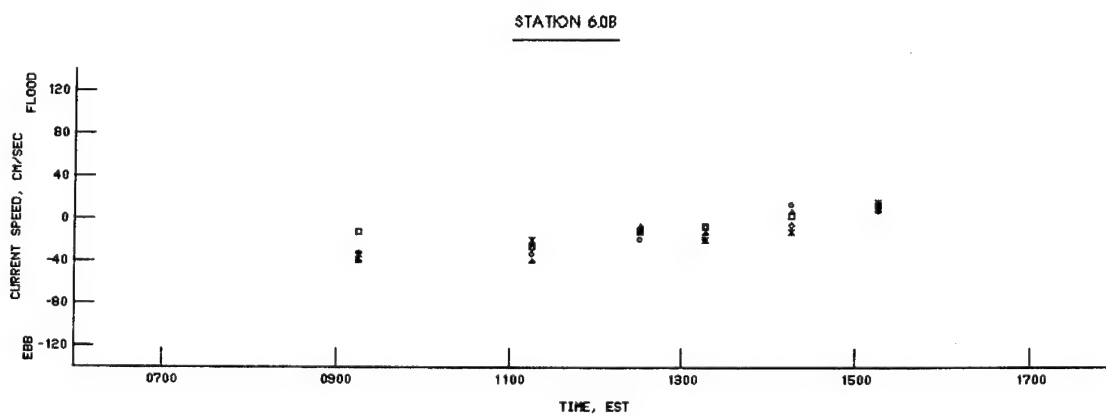
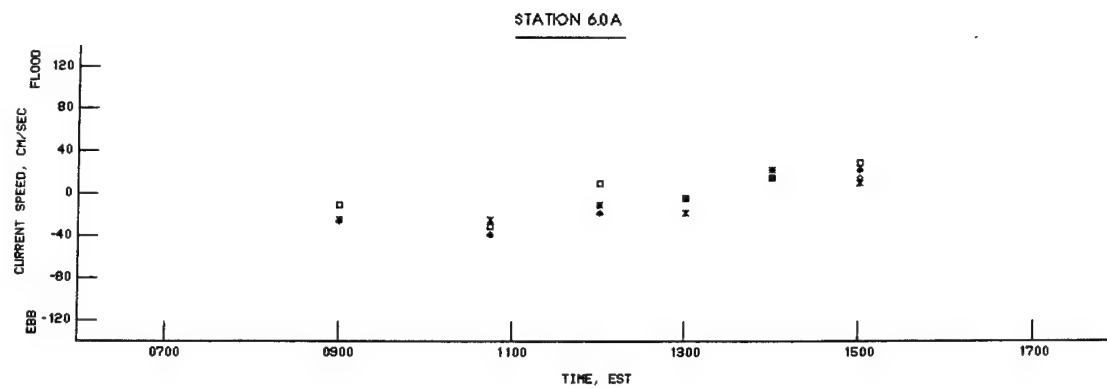
**CURRENT SPEED
STATIONS S5.A AND S5.0B
04/27/93**



LEGEND

- - SURFACE
- △ - MIDDLEDEPTH
- × - BOTTOM

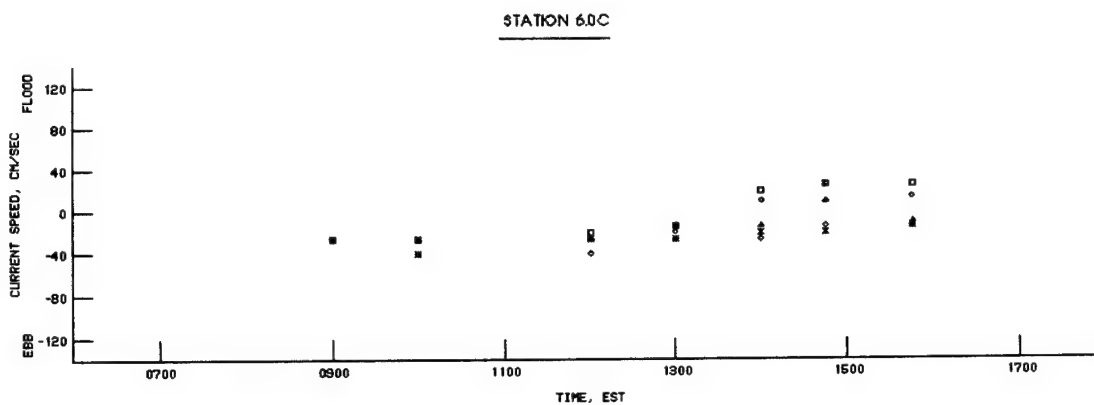
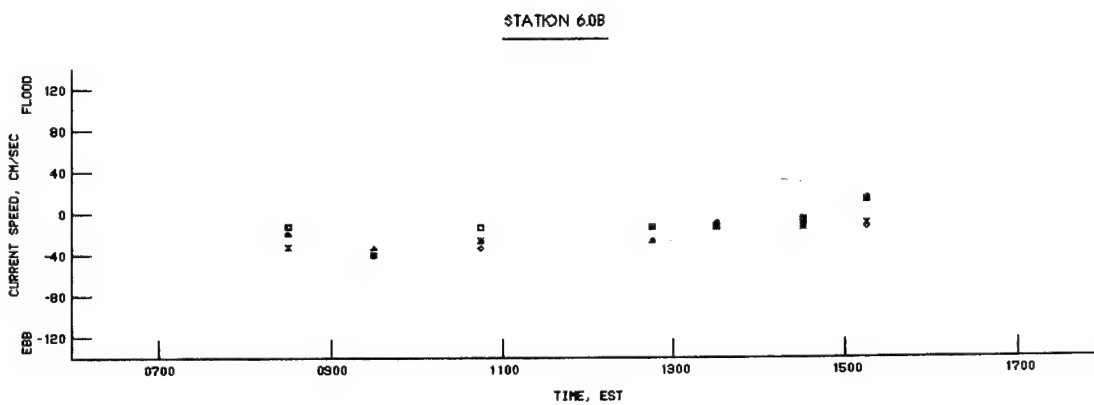
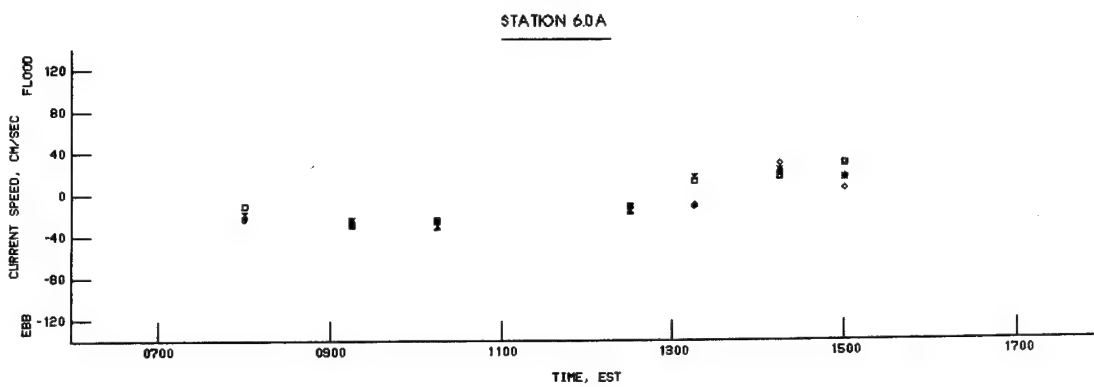
**CURRENT SPEED
STATIONS S5.0A AND 5.0B
04/29/93**



LEGEND

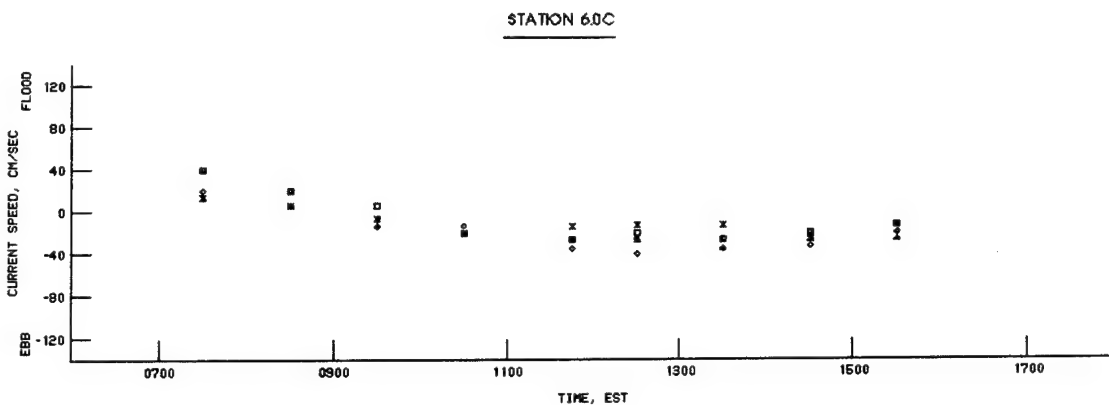
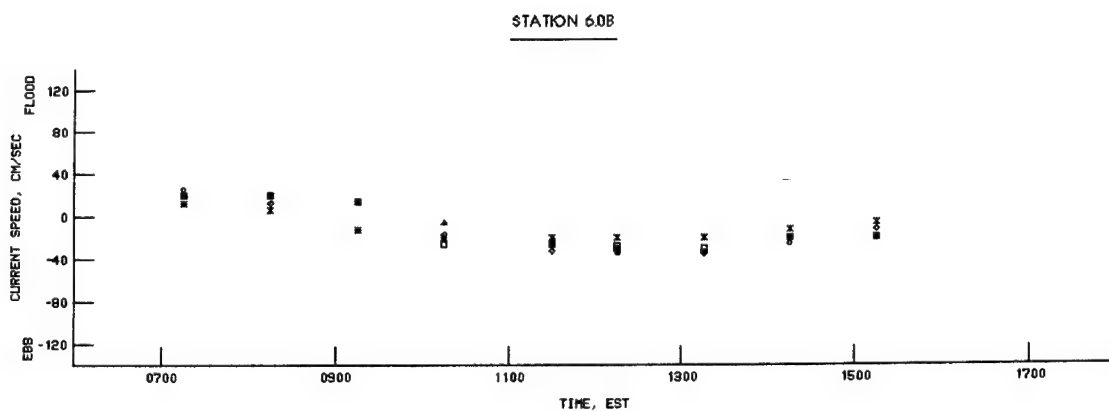
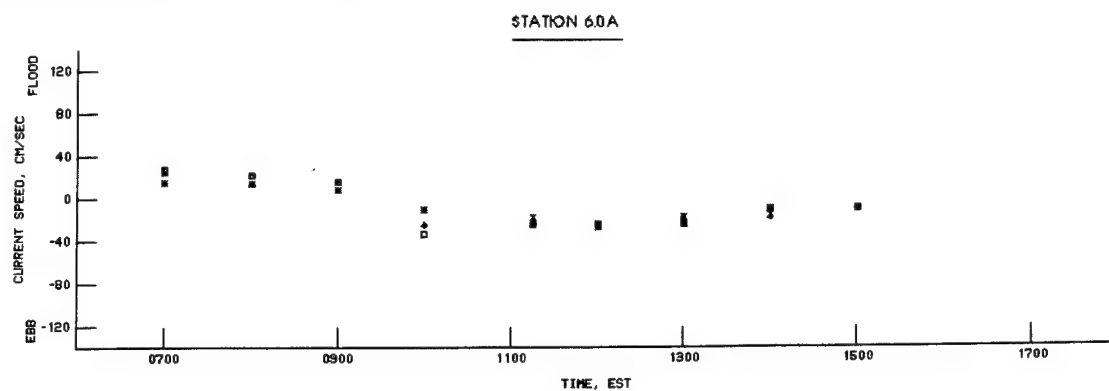
- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- × - BOTTOM

**CURRENT SPEED
STATIONS S6.0A, S6.0B, AND S6.0C
04/19/93**



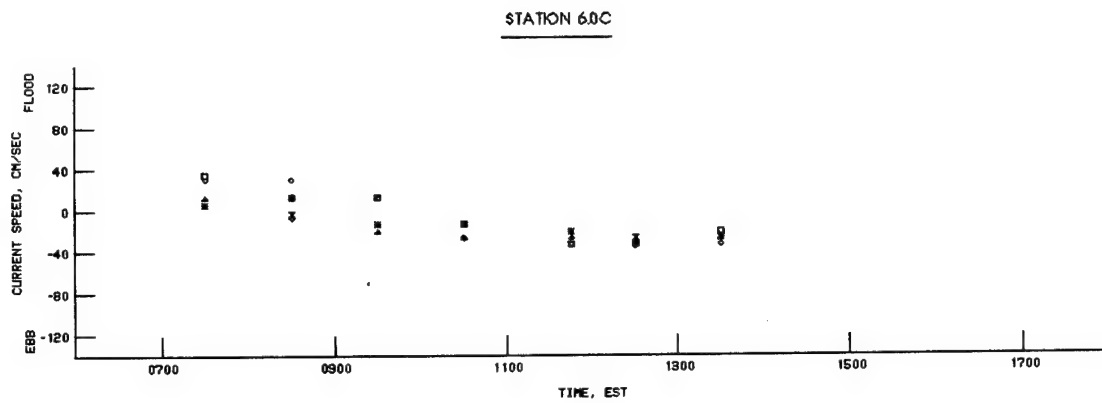
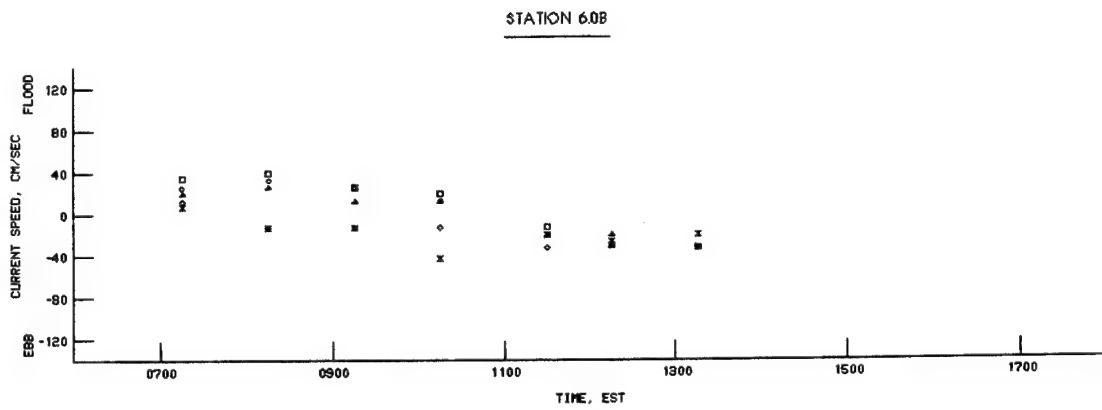
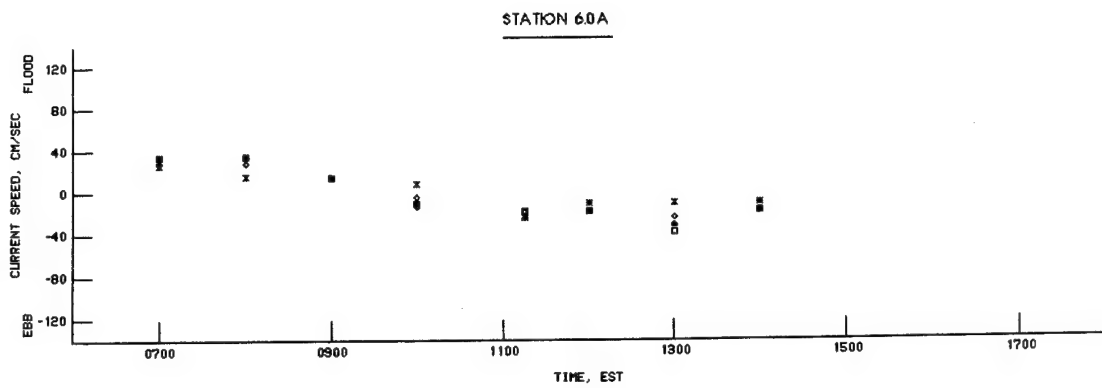
- LEGEND**
- - SURFACE
 - - ONE-QUARTER DEPTH
 - △ - MIDDDEPTH
 - ◇ - THREE-QUARTER DEPTH
 - × - BOTTOM

**CURRENT SPEED
STATIONS S6.0A, S6.0B, AND S6.0C
04/20/93**



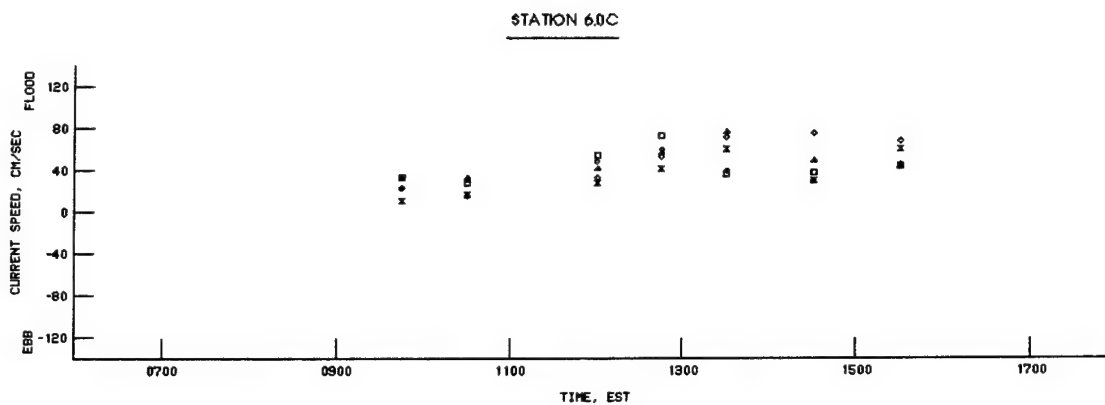
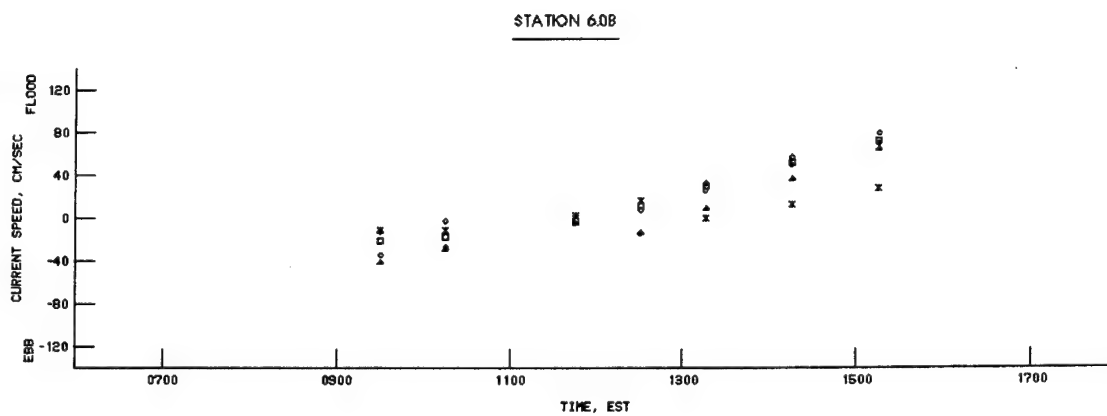
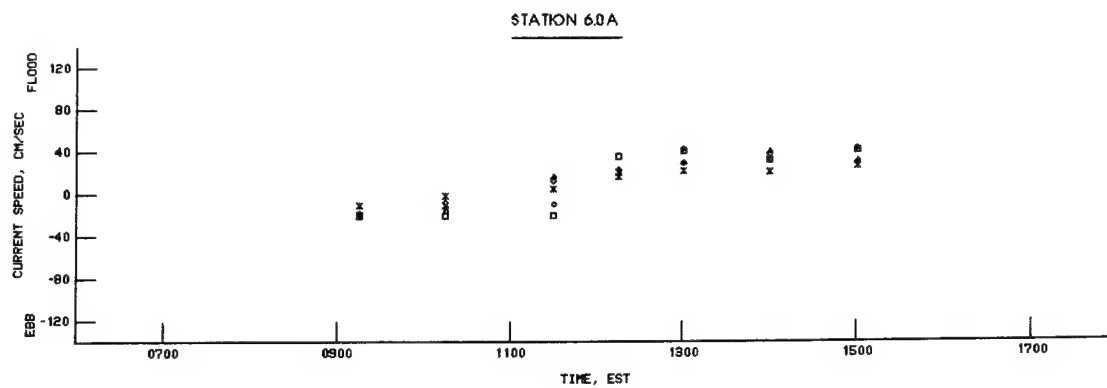
- LEGEND**
- - SURFACE
 - - ONE-QUARTER DEPTH
 - △ - MIDDEPTH
 - ◇ - THREE-QUARTER DEPTH
 - ✱ - BOTTOM

**CURRENT SPEED
STATIONS S6.0A, S6.0B, AND S6.0C
04/24/93**



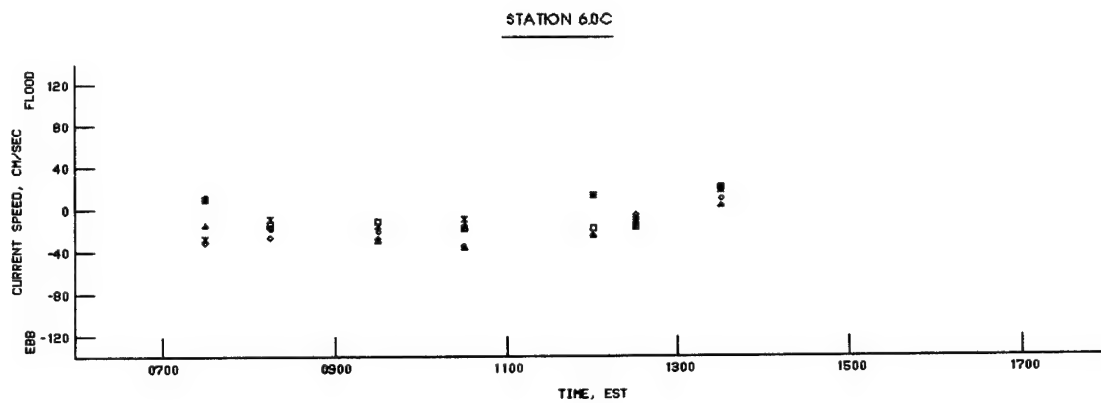
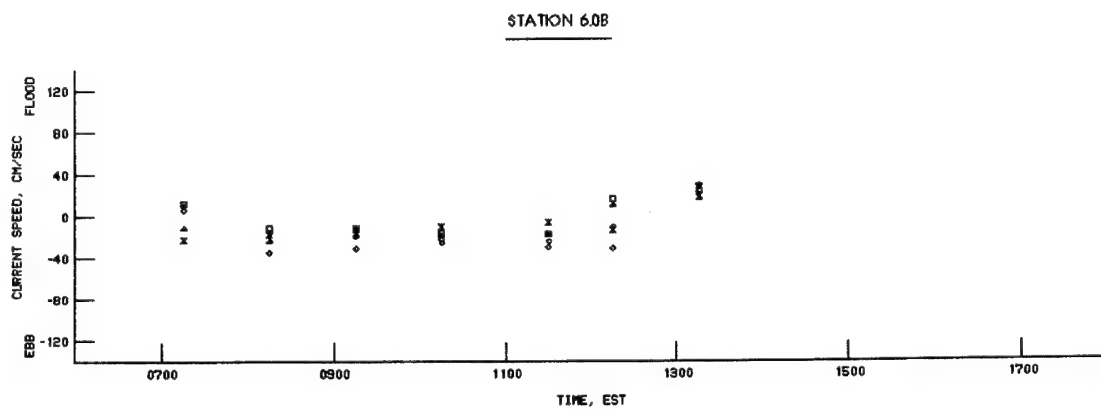
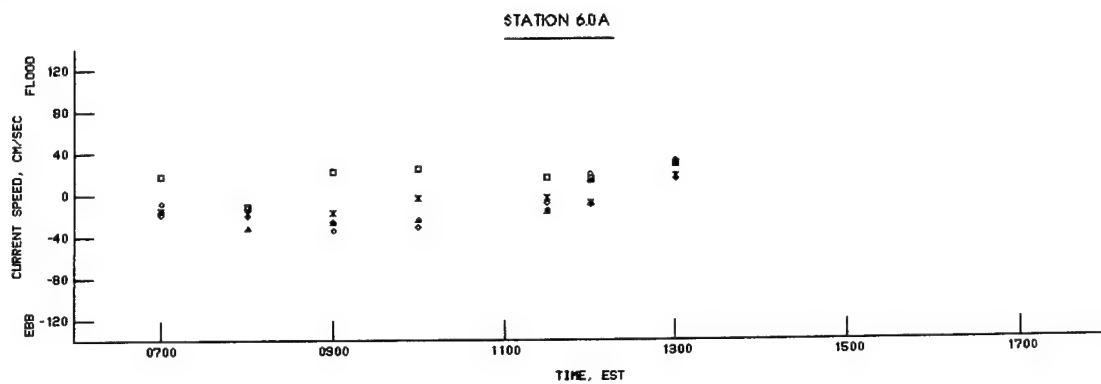
- LEGEND**
- - SURFACE
 - - ONE-QUARTER DEPTH
 - △ - MIDDEPTH
 - ◇ - THREE-QUARTER DEPTH
 - ✱ - BOTTOM

**CURRENT SPEED
STATIONS S6.0A, S6.0B, AND S6.0C
04/25/93**



- LEGEND**
- - SURFACE
 - - ONE-QUARTER DEPTH
 - △ - MIDDEPTH
 - ◇ - THREE-QUARTER DEPTH
 - ✱ - BOTTOM

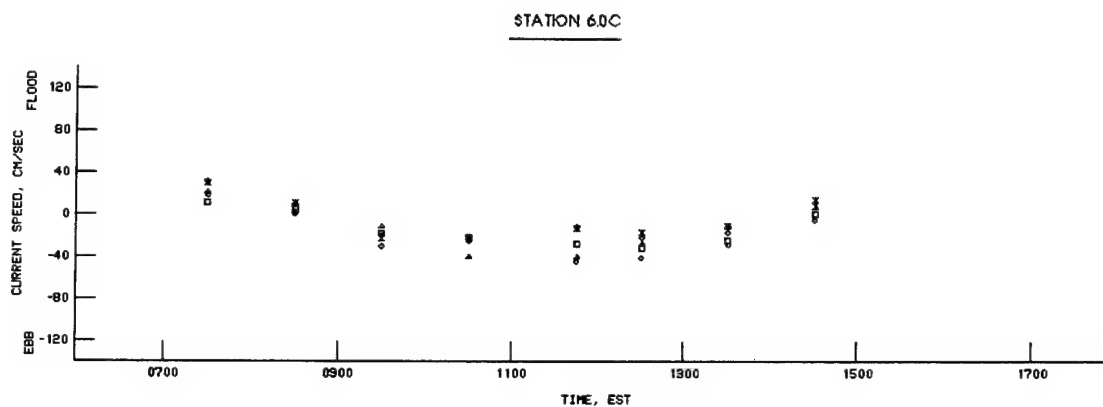
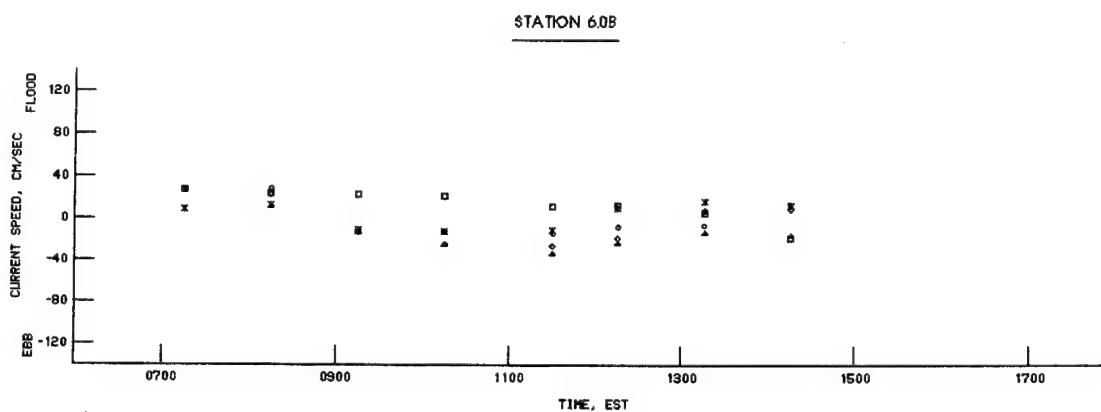
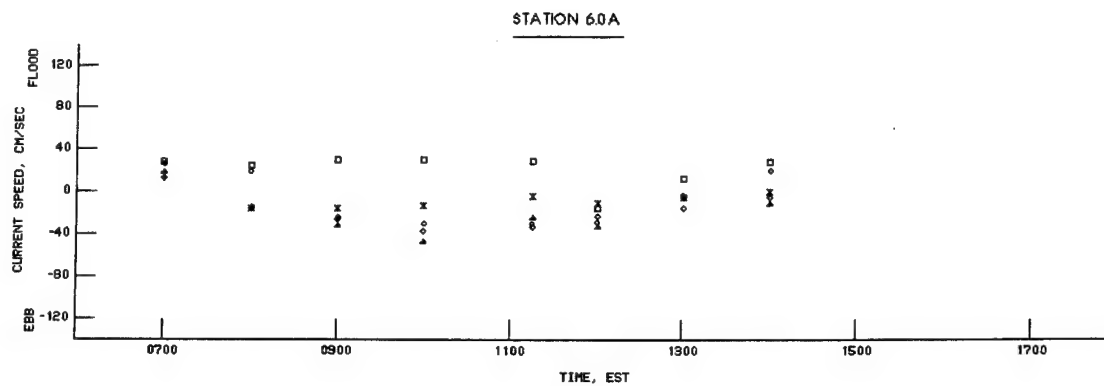
**CURRENT SPEED
STATIONS S6.0A, S6.0B, AND S6.0C
04/28/93**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- * - BOTTOM

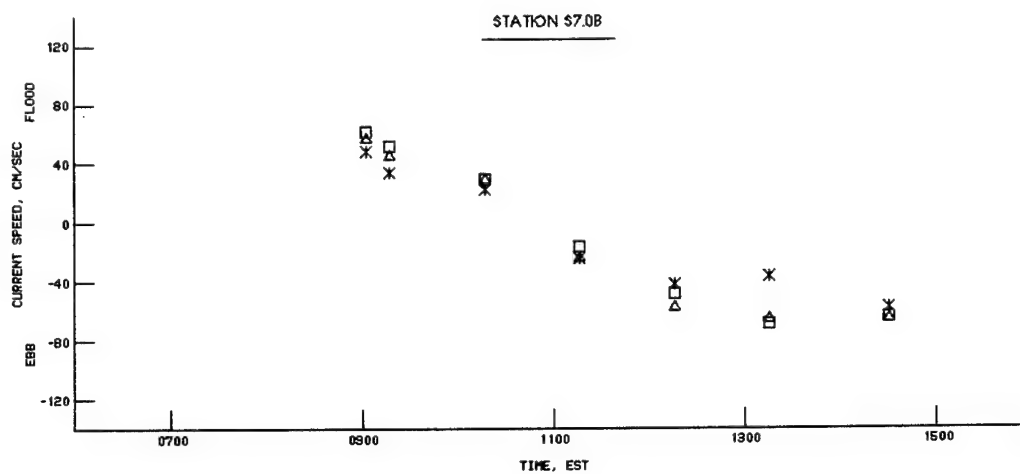
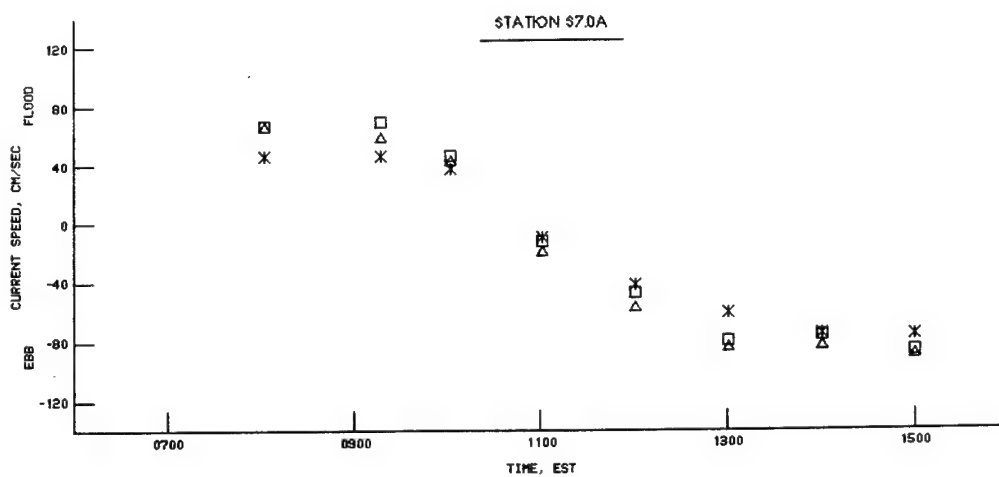
**CURRENT SPEED
STATIONS S6.0A, S6.0B, AND S6.0C
04/29/93**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- × - BOTTOM

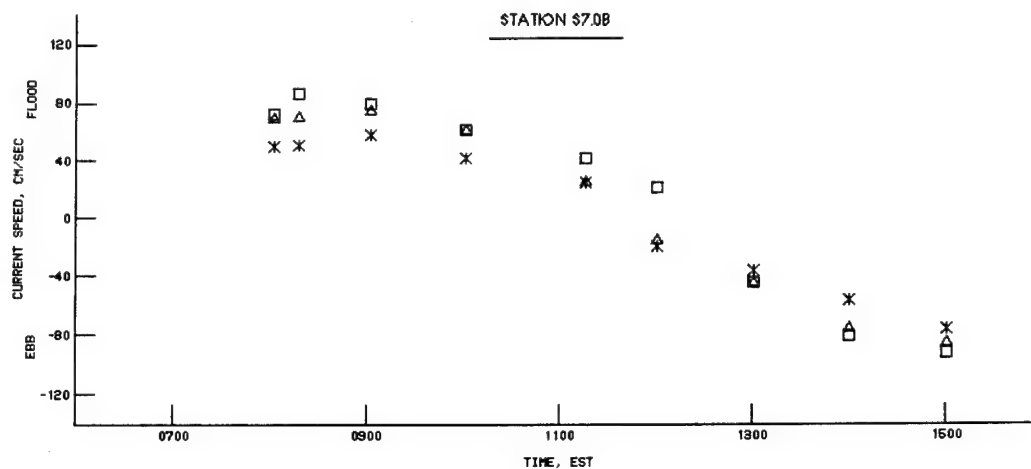
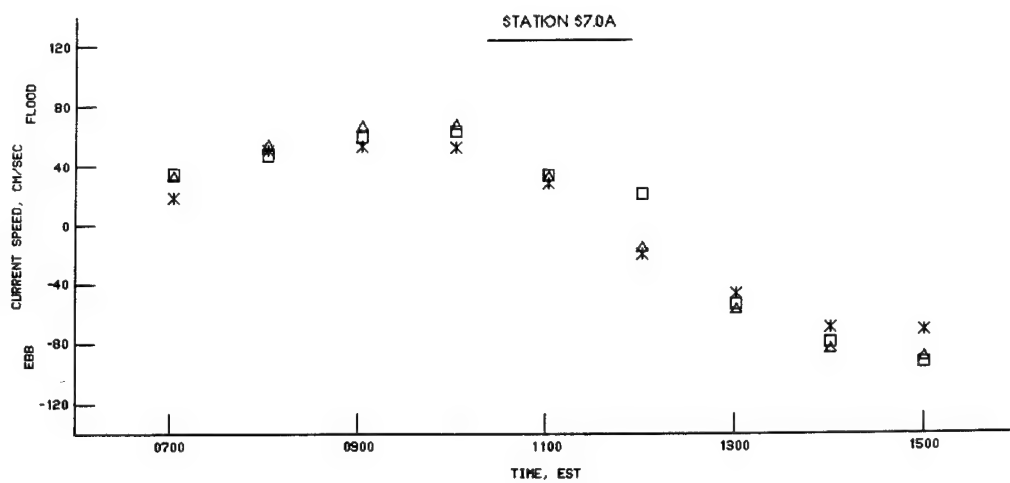
**CURRENT SPEED
STATIONS S6.0A, S6.0B, AND S6.0C
04/30/93**



LEGEND

- - SURFACE
- △ - MIDDEPTH
- * - BOTTOM

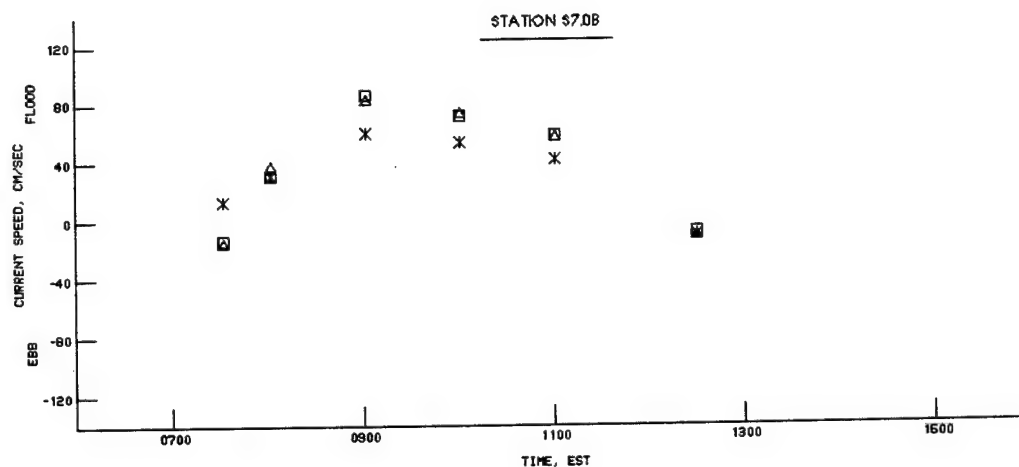
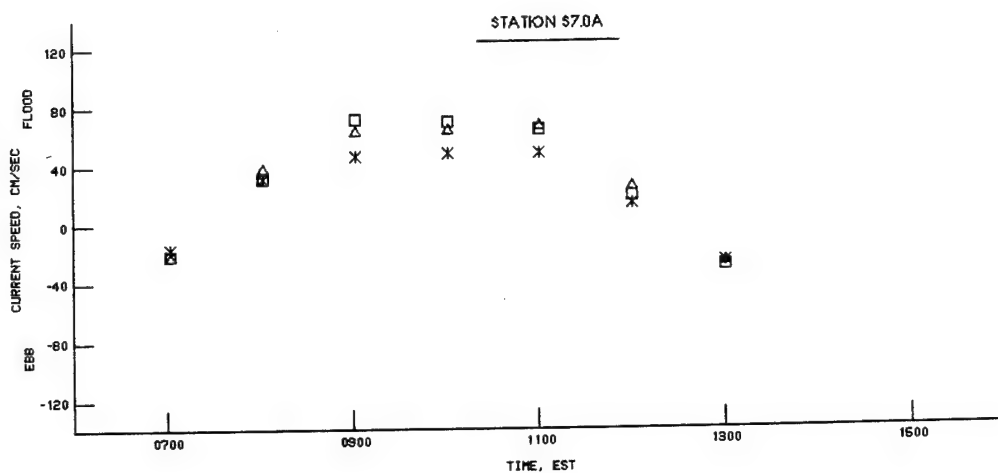
**CURRENT SPEED
STATIONS S7.0A AND S7.0B
04/19/93**



LEGEND

- - SURFACE
- △ - MIDDEPTH
- * - BOTTOM

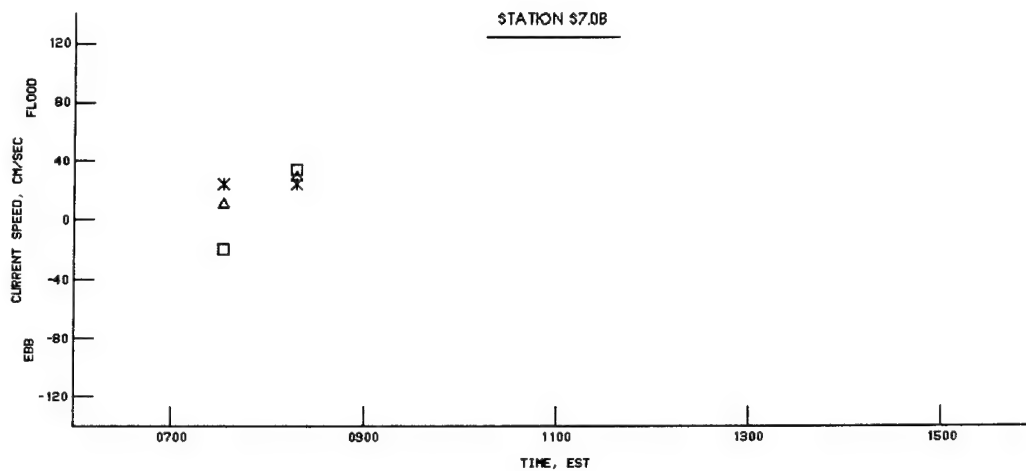
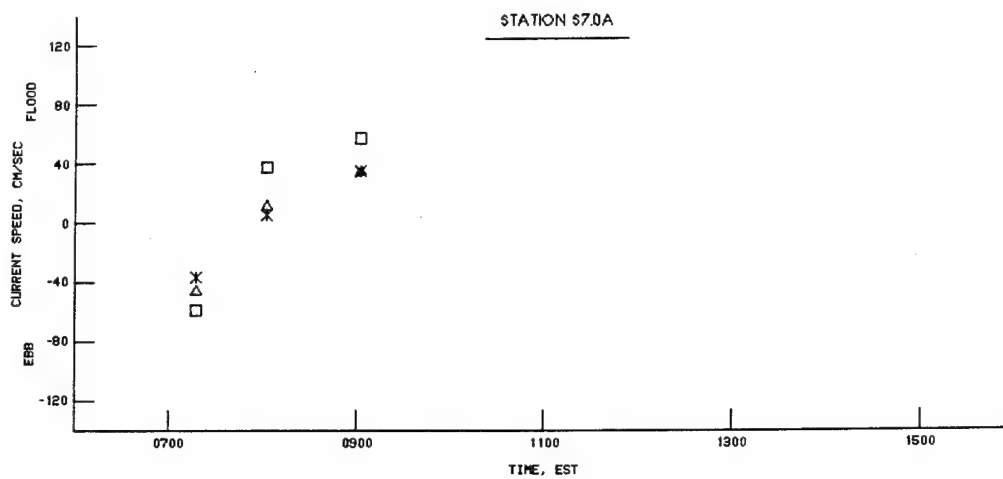
**CURRENT SPEED
STATIONS S7.0A AND S7.0B
04/20/93**



LEGEND

- - SURFACE
- △ - MIDDEPTH
- ✕ - BOTTOM

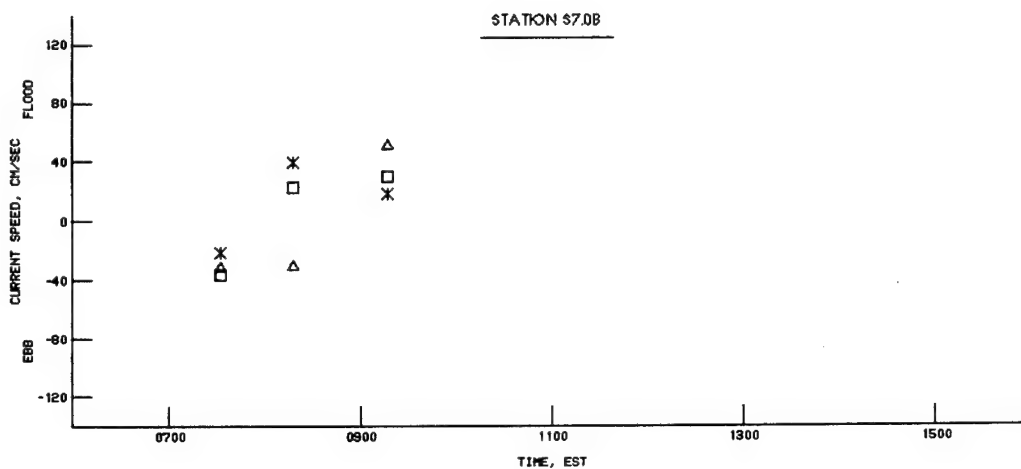
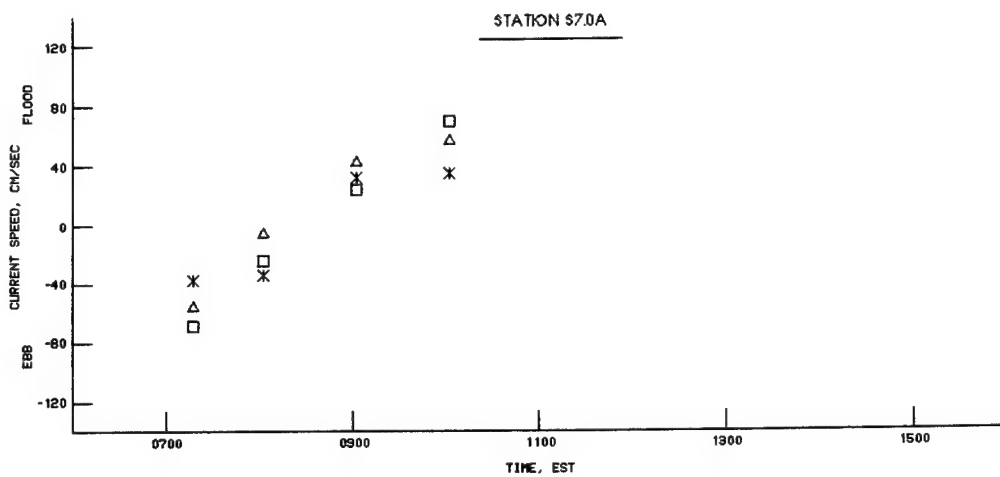
**CURRENT SPEED
STATIONS S7.0A AND S7.0B
04/21/93**



LEGEND

- - SURFACE
- △ - MIDDEPTH
- ✕ - BOTTOM

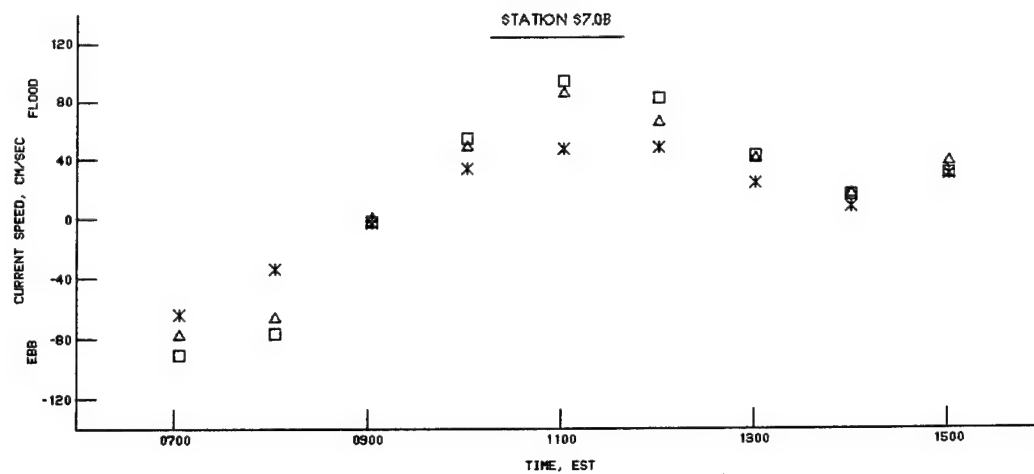
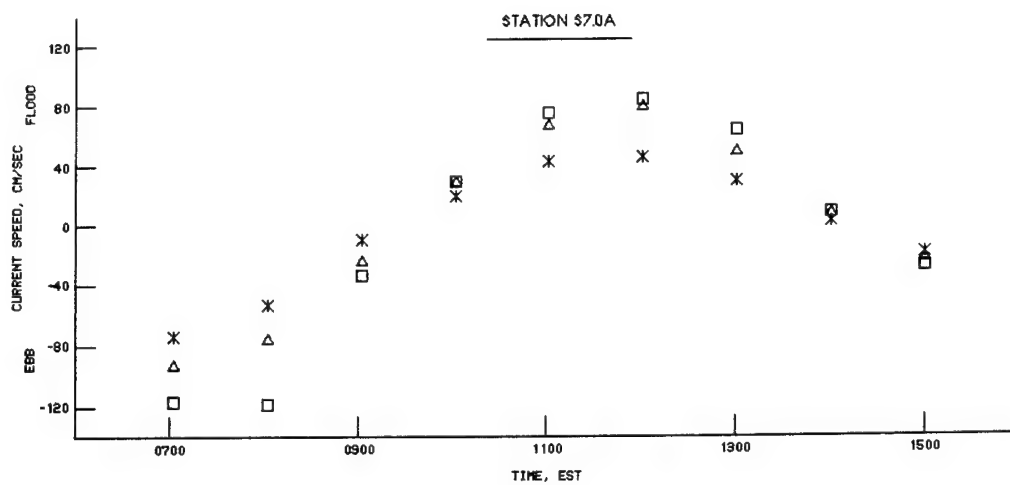
**CURRENT SPEED
STATIONS S7.0A AND S7.0B
04/22/93**



LEGEND

- - SURFACE
- △ - MIDDEPTH
- × - BOTTOM

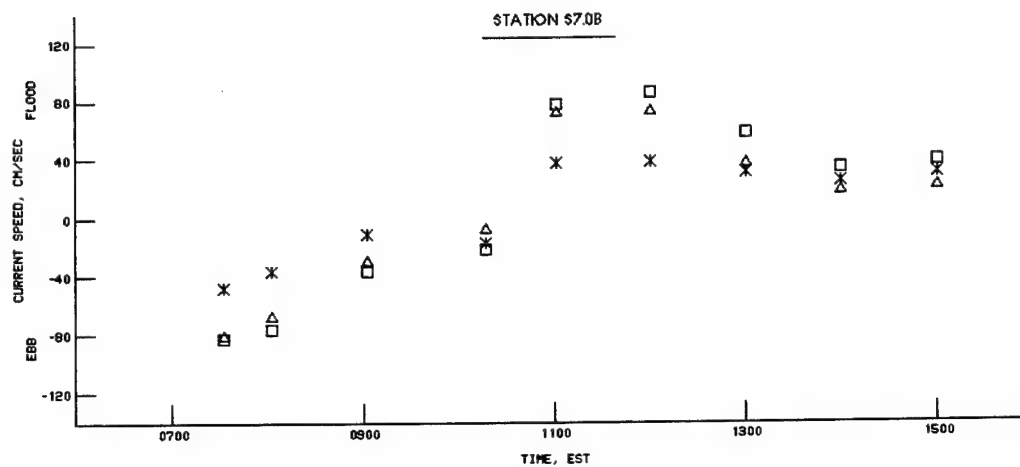
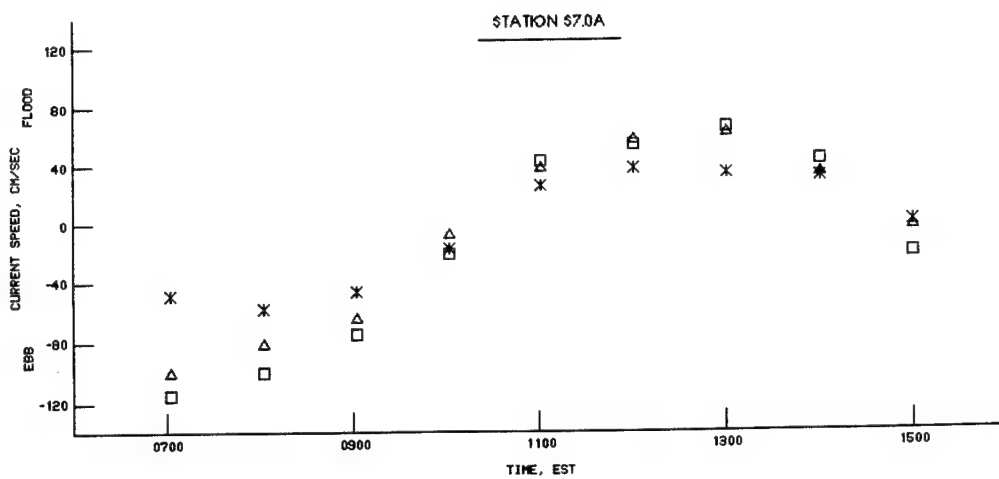
**CURRENT SPEED
STATIONS S7.0A AND S7.0B
04/23/93**



LEGEND

- - SURFACE
- △ - MIDDEPTH
- * - BOTTOM

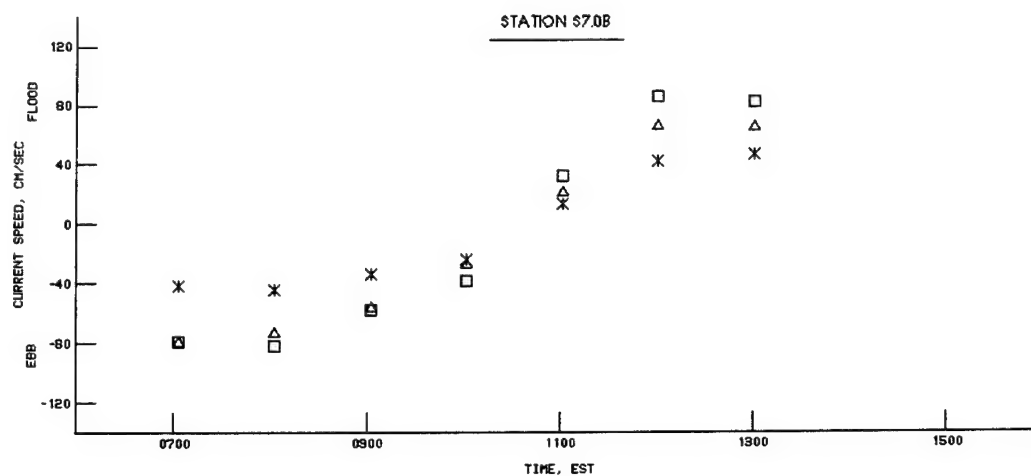
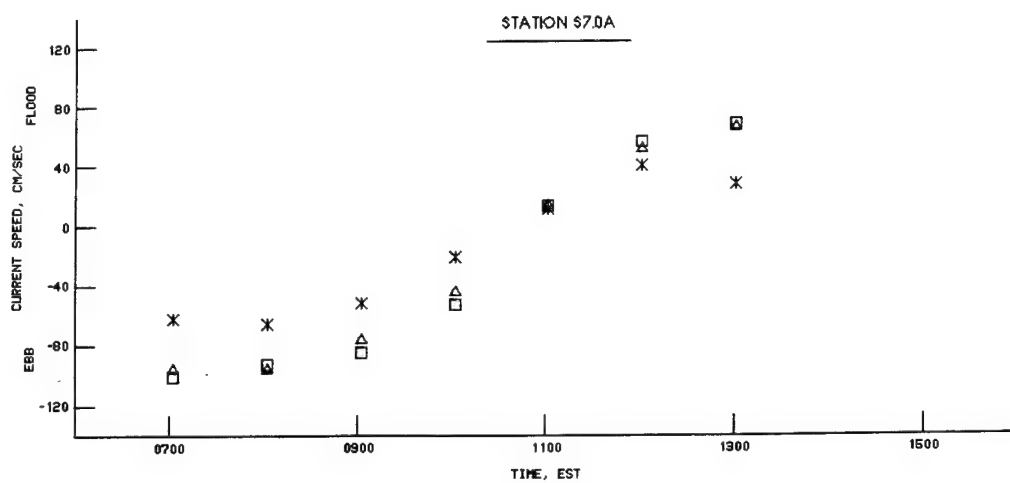
**CURRENT SPEED
STATIONS S7.0A AND S7.0B
04/24/93**



LEGEND

- - SURFACE
- △ - MIDDEPTH
- ✕ - BOTTOM

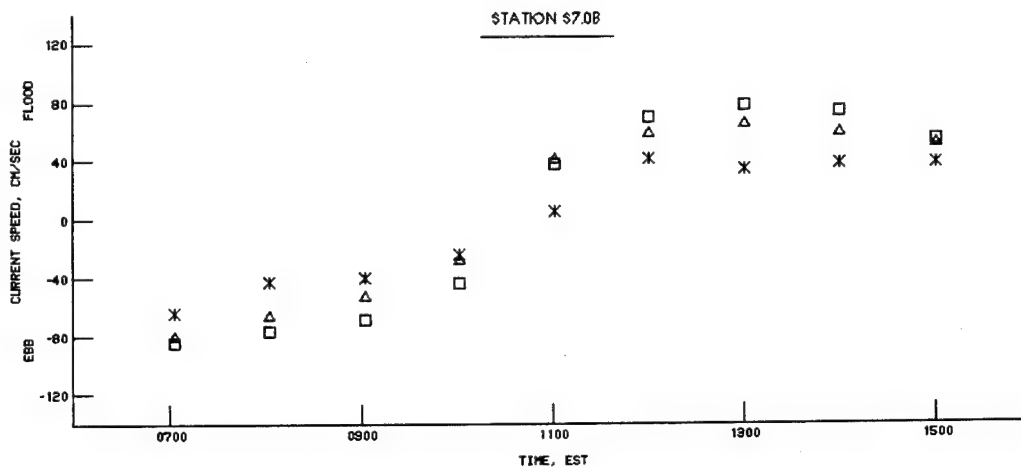
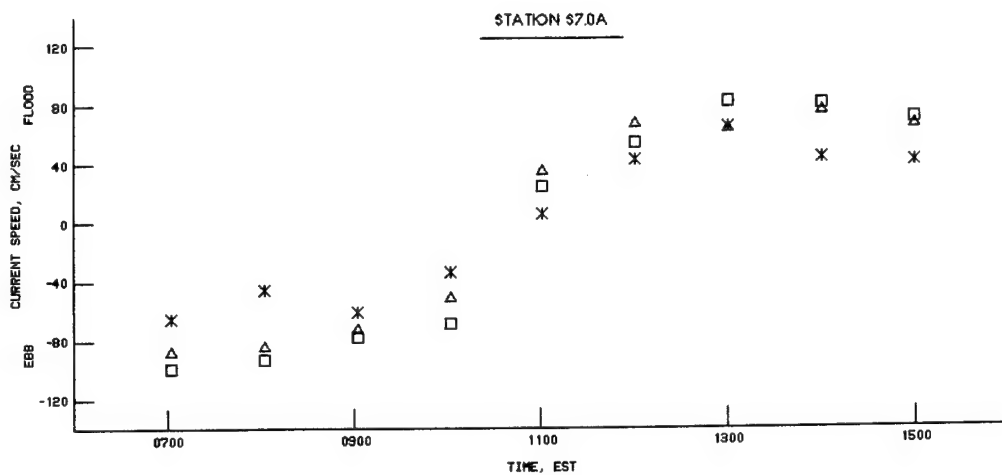
**CURRENT SPEED
STATIONS S7.0A AND S7.0B
04/25/93**



LEGEND

- - SURFACE
- △ - MIDDEPTH
- ✱ - BOTTOM

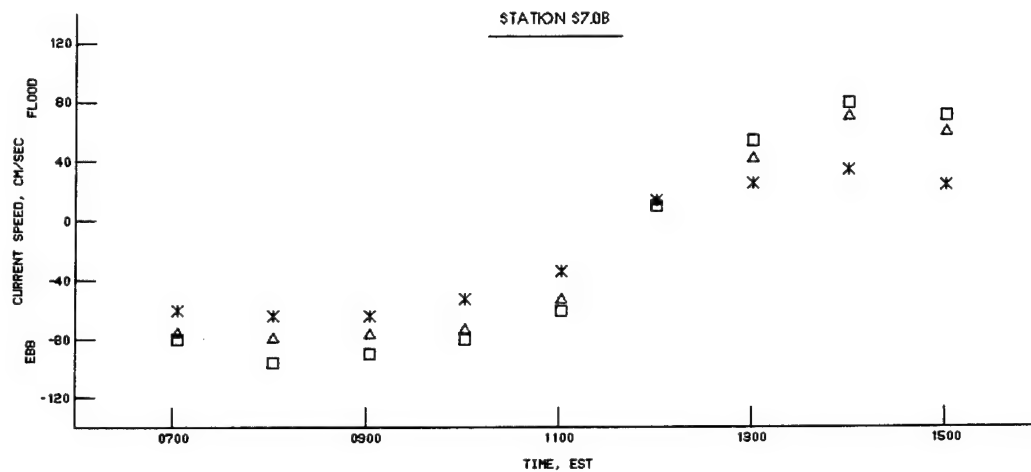
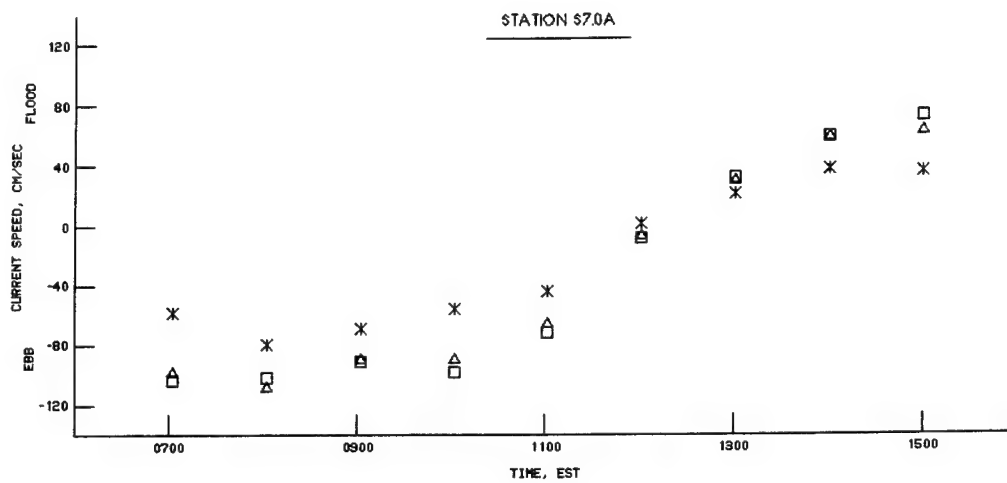
**CURRENT SPEED
STATIONS S7.0A AND S7.0B
04/26/93**



LEGEND

- - SURFACE
- △ - MIDDEPTH
- × - BOTTOM

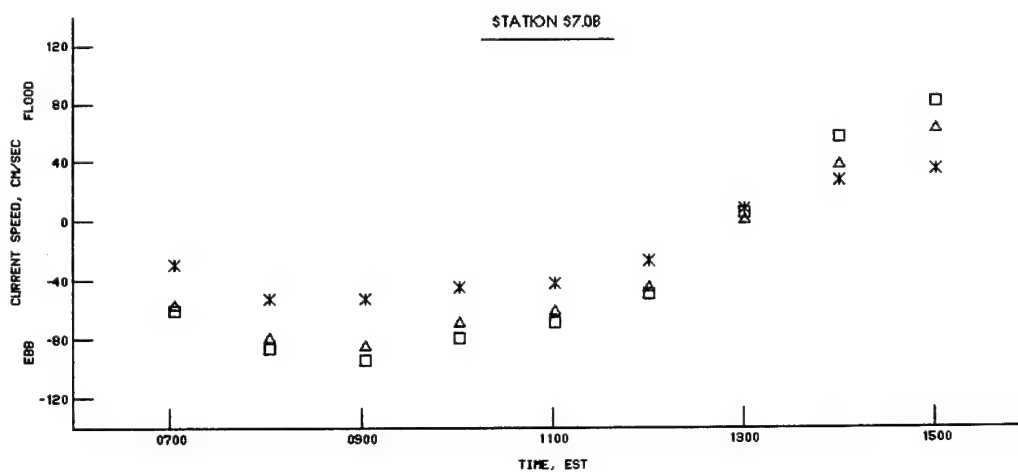
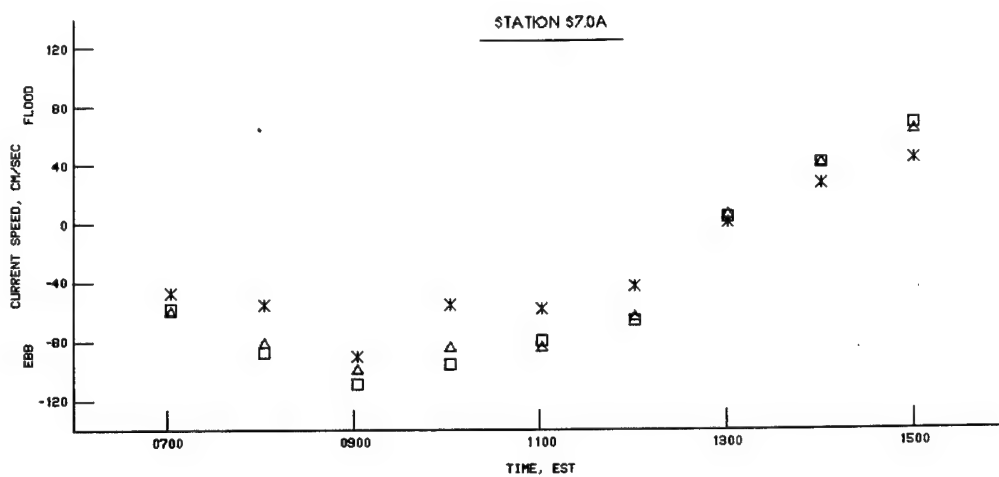
**CURRENT SPEED
STATIONS S7.0A AND S7.0B
04/27/93**



LEGEND

- - SURFACE
- △ - MIDDEPTH
- ✕ - BOTTOM

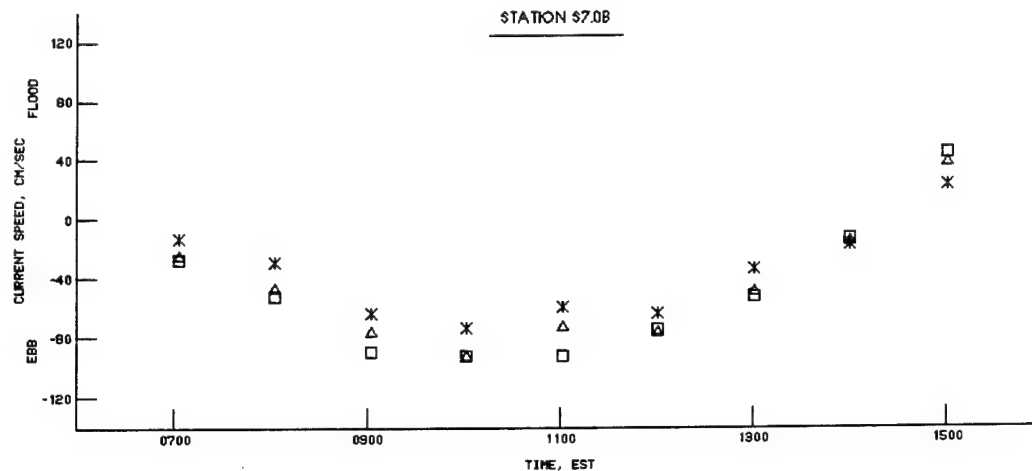
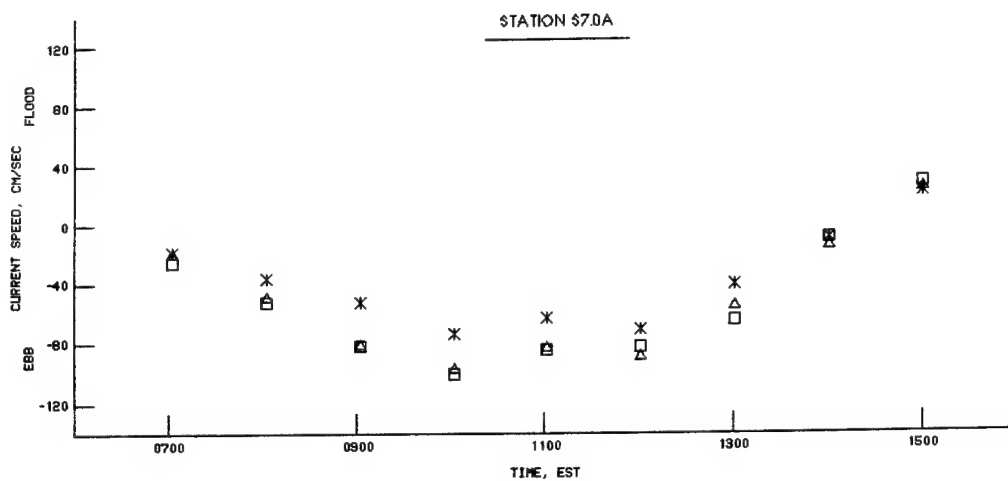
**CURRENT SPEED
STATIONS S7.0A AND S7.0B
04/28/93**



LEGEND

- - SURFACE
- △ - MIDDEPTH
- × - BOTTOM

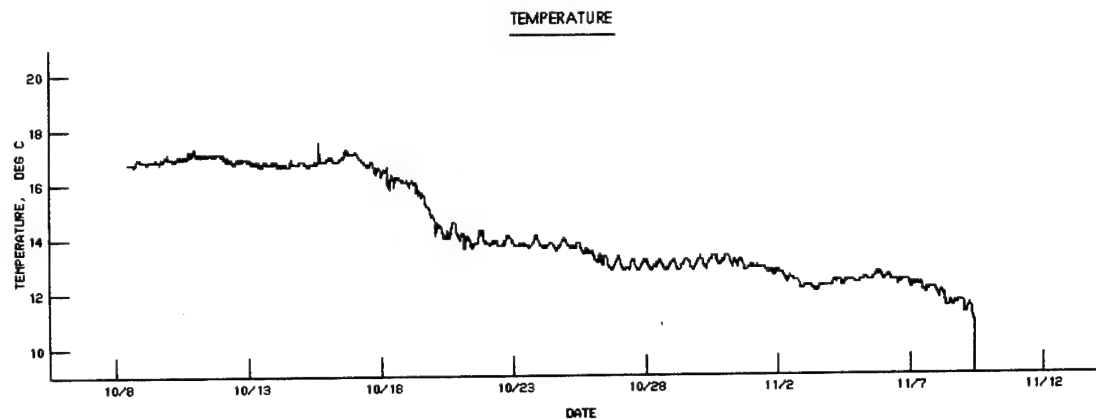
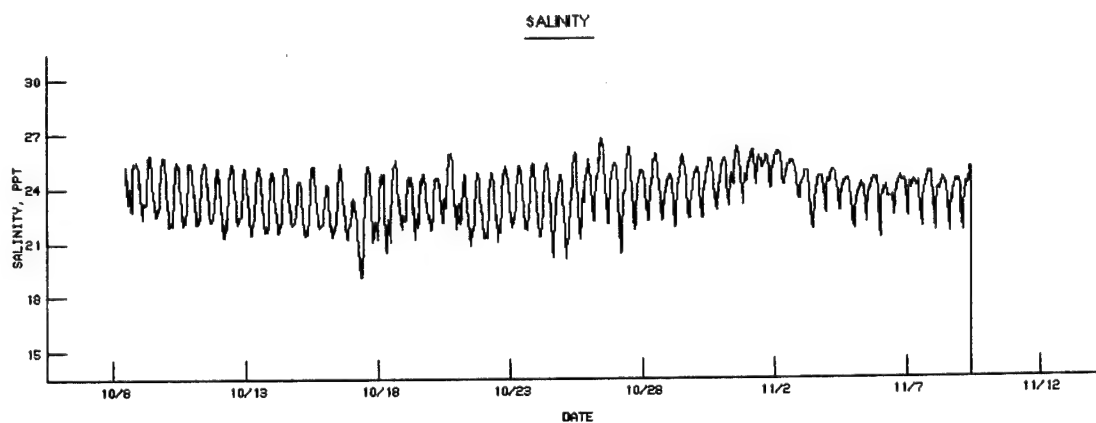
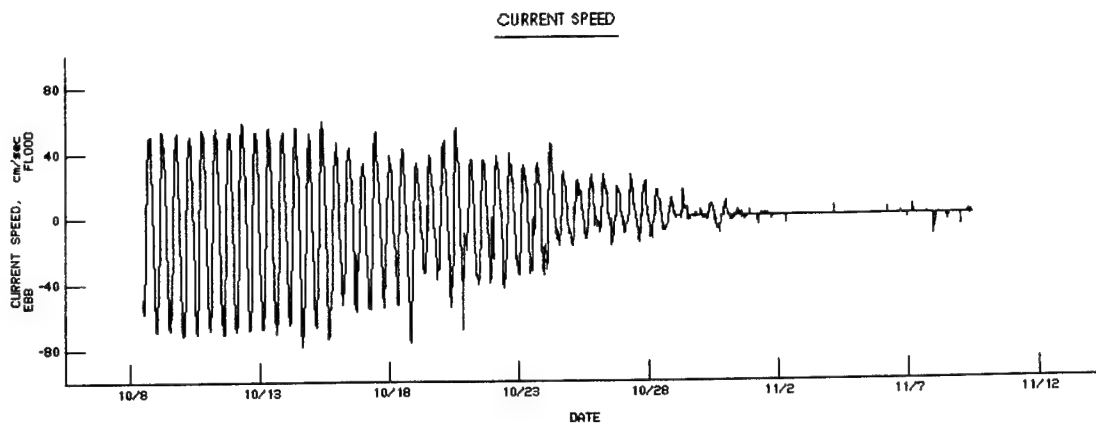
**CURRENT SPEED
STATIONS S7.0A AND S7.0B
04/29/93**



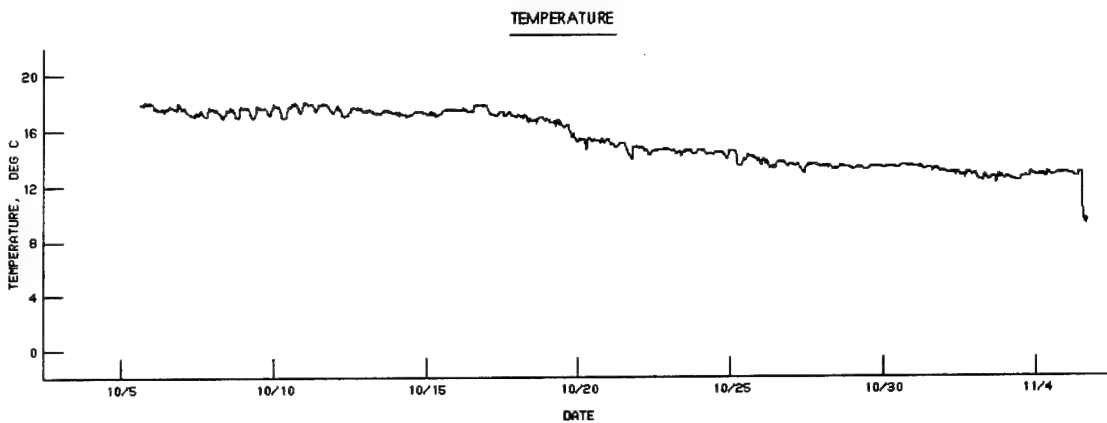
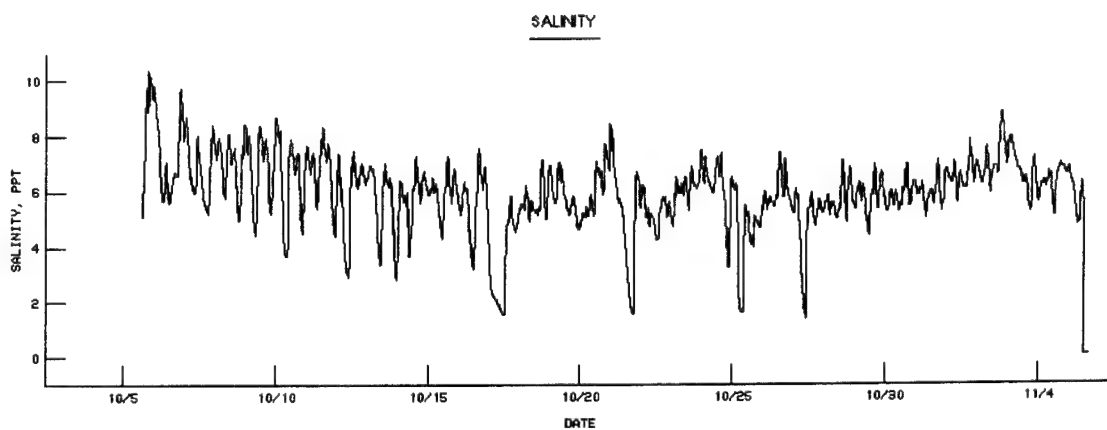
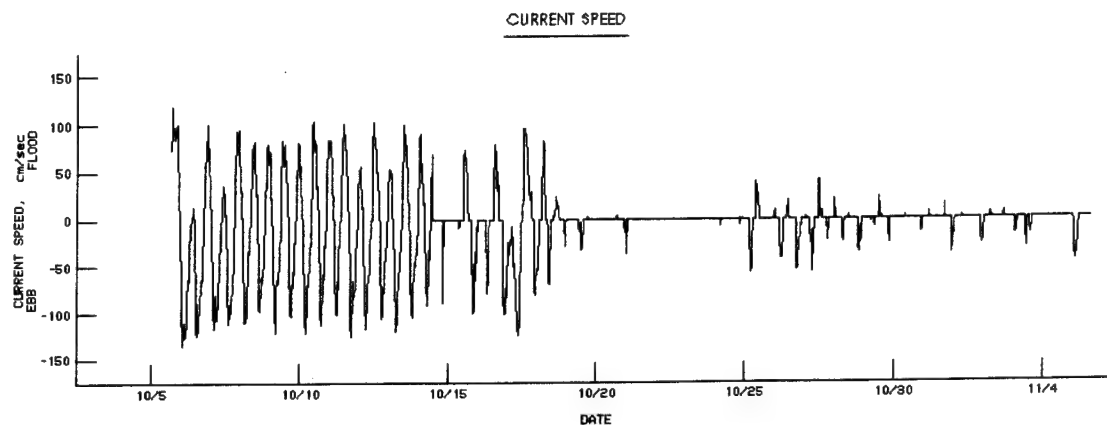
LEGEND

- - SURFACE
- △ - MIDDEPTH
- × - BOTTOM

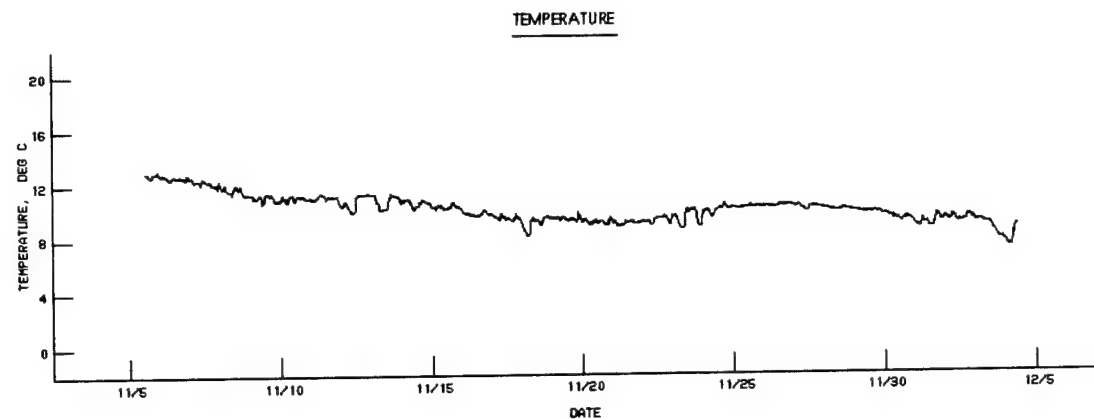
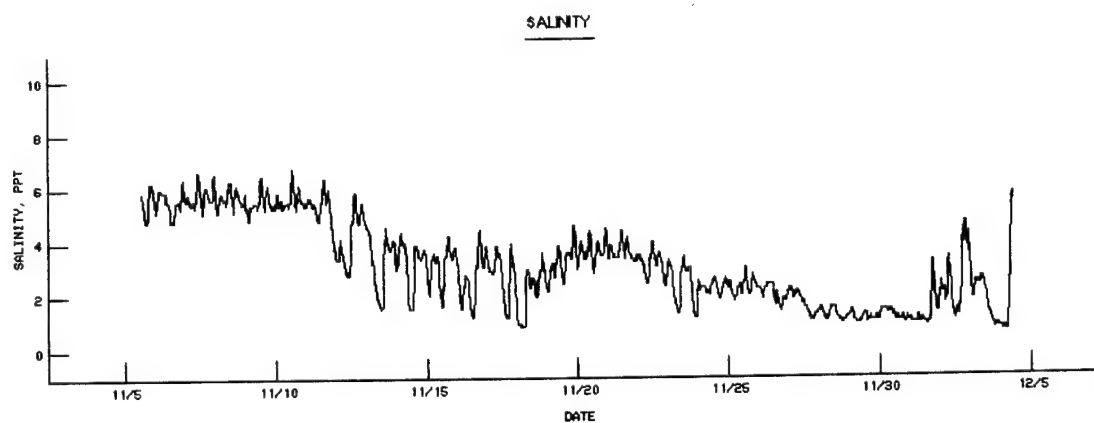
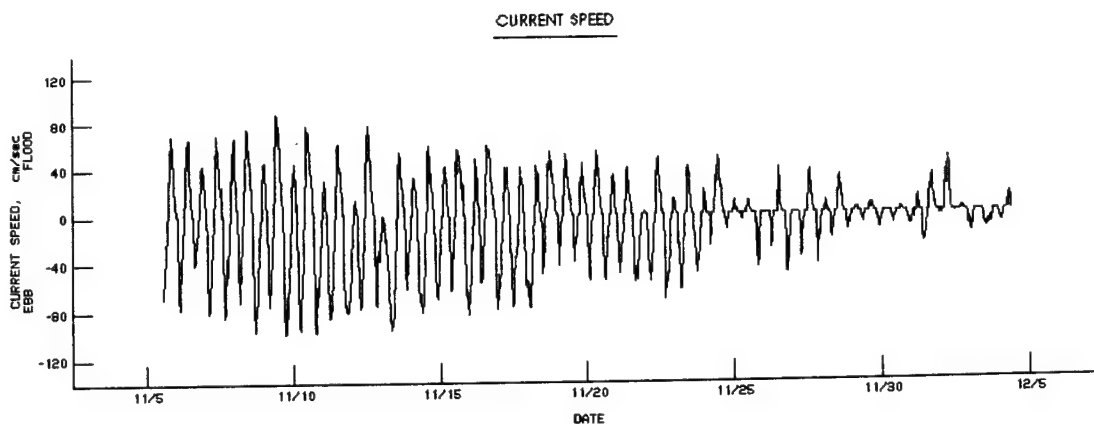
**CURRENT SPEED
STATIONS S7.0A AND S7.0B
04/30/93**



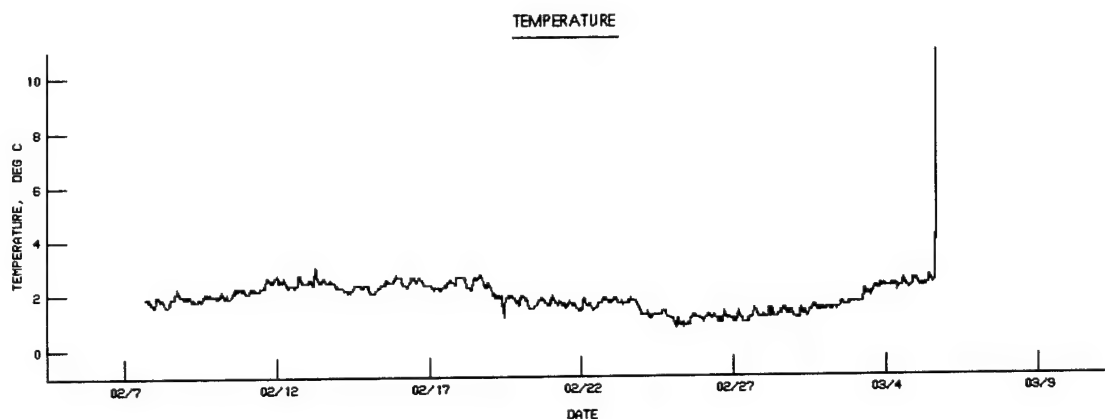
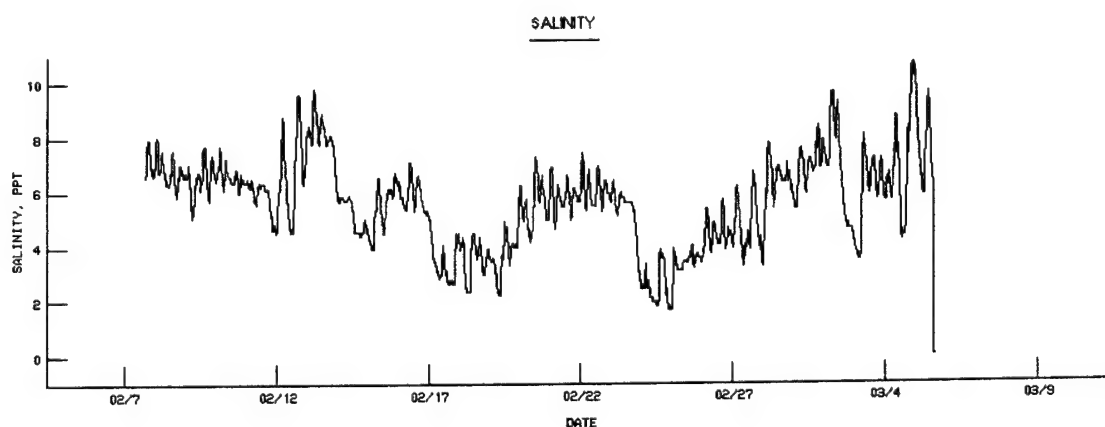
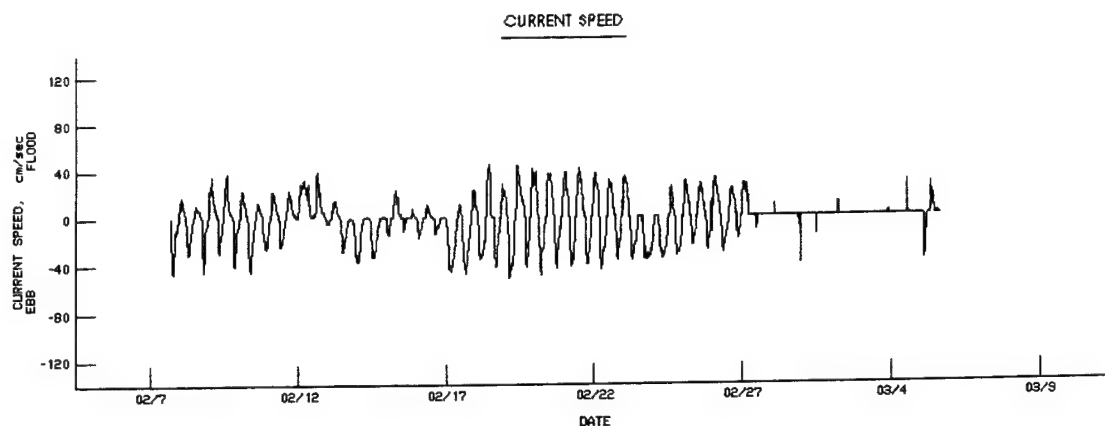
CURRENT SPEED, SALINITY,
AND TEMPERATURE
STATION S1.8, 60% DEPTH
10/08/92 - 11/09/92



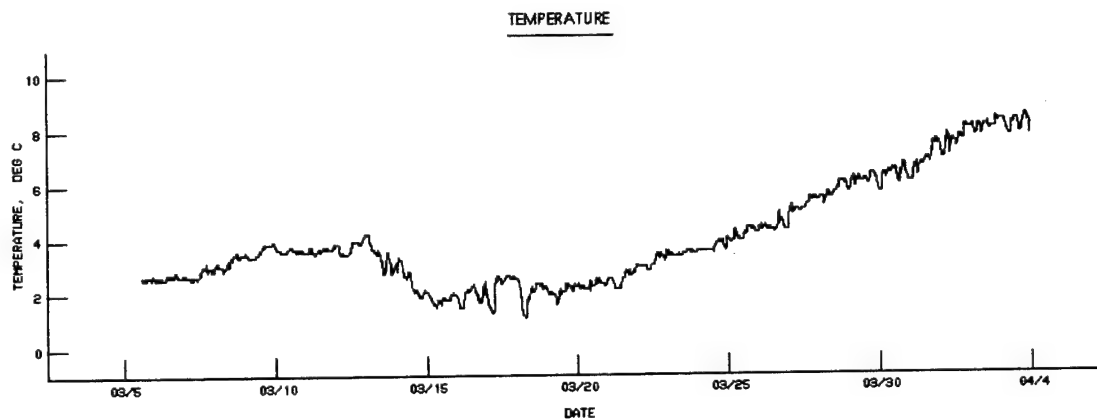
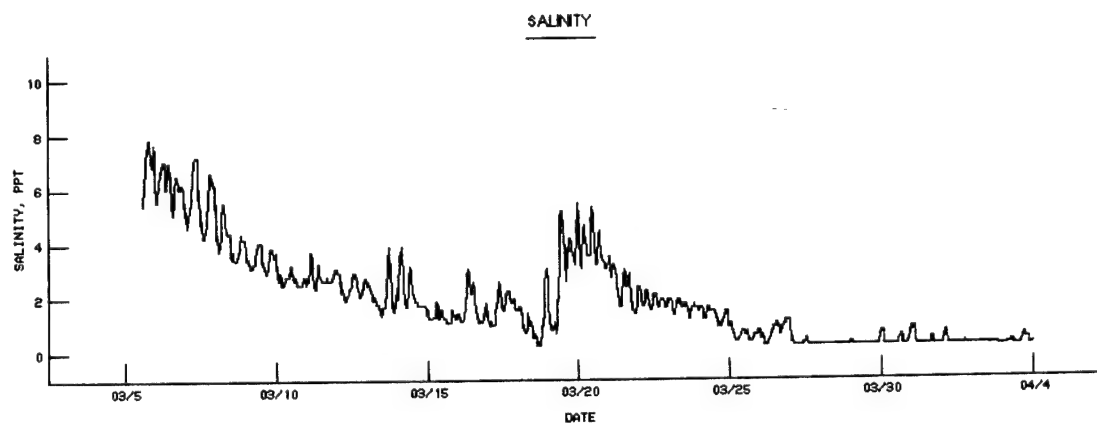
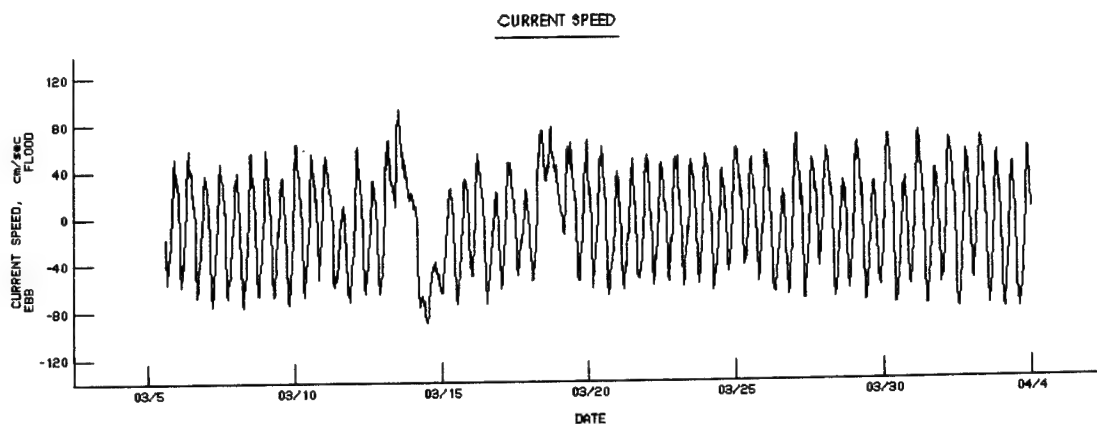
CURRENT SPEED, SALINITY,
AND TEMPERATURE
STATION S3.5, 60% DEPTH
10/05/92 - 11/05/92



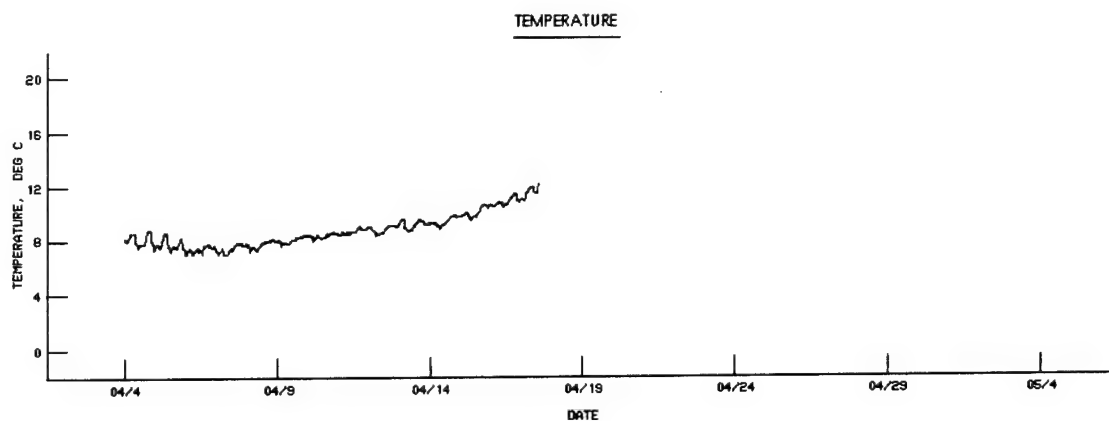
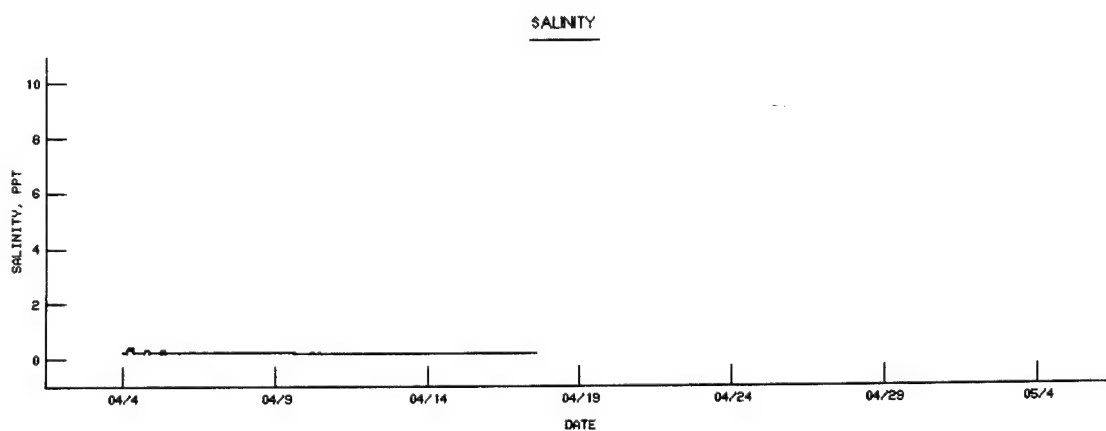
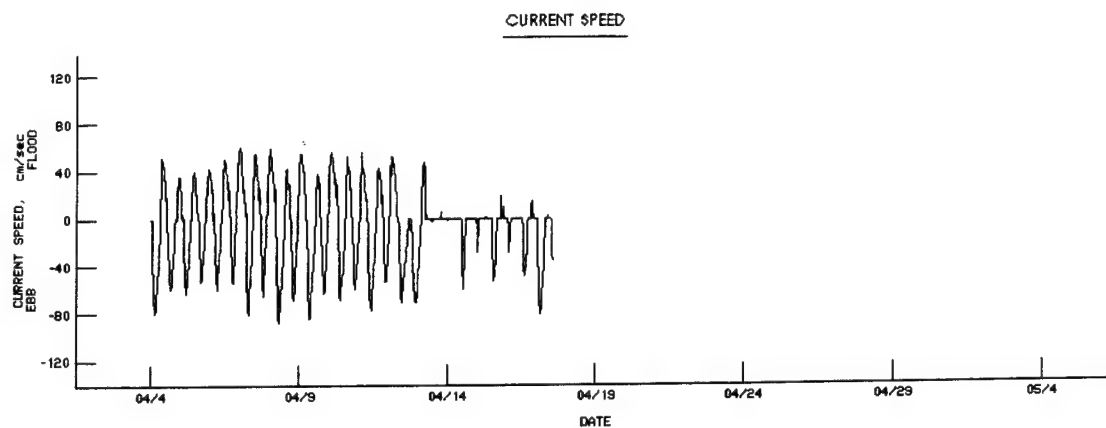
CURRENT SPEED, SALINITY,
AND TEMPERATURE
STATION S3.5, 60% DEPTH
11/05/92 - 12/04/92



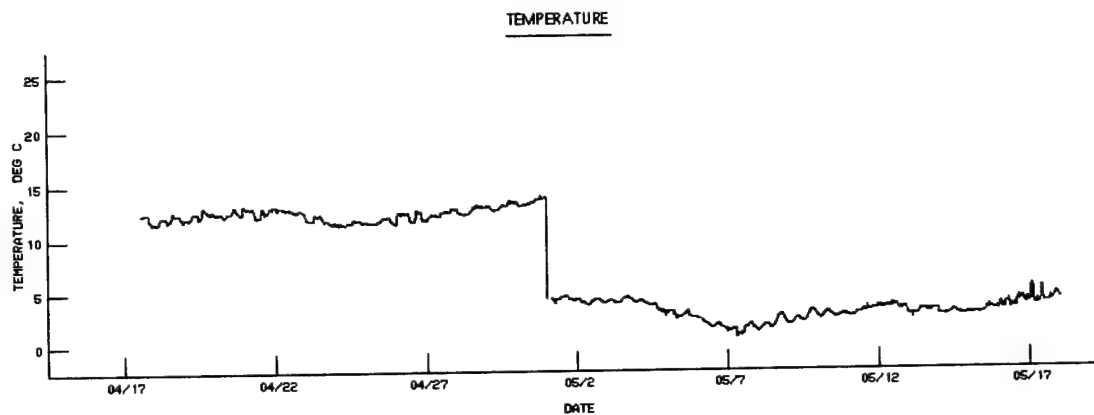
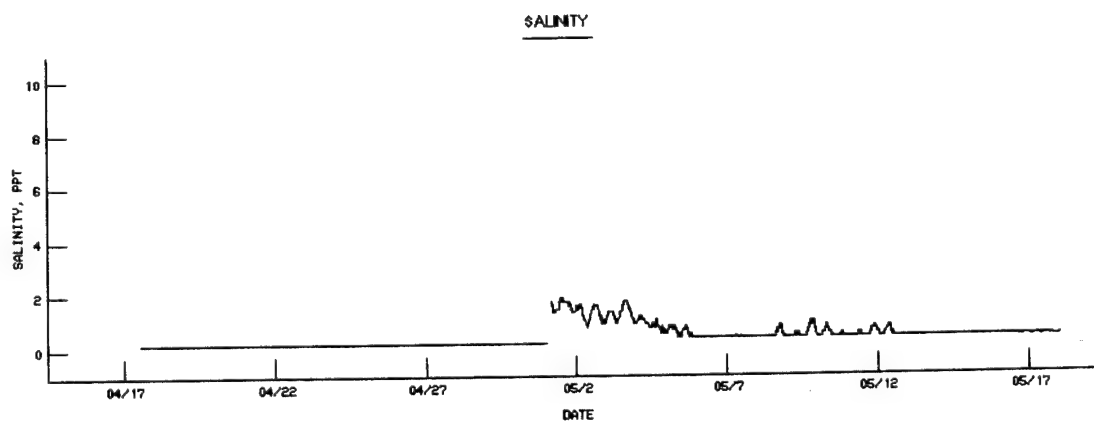
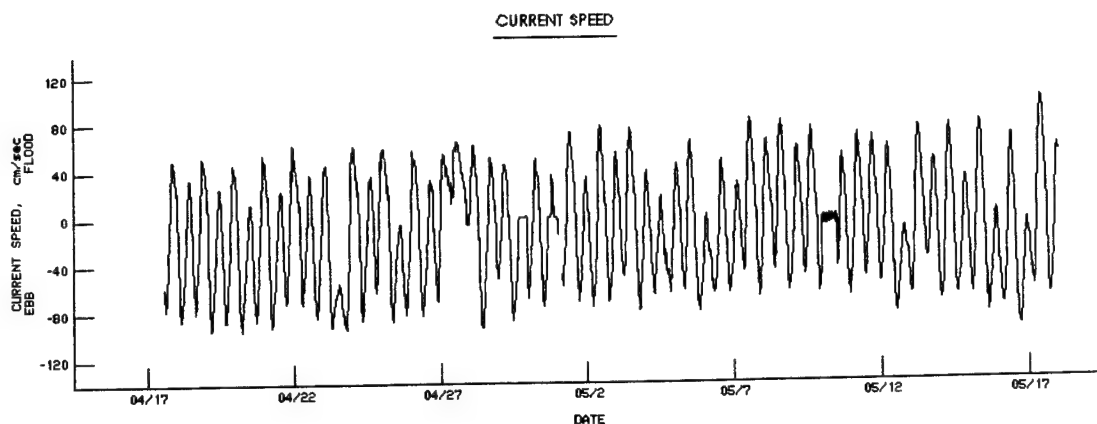
CURRENT SPEED, SALINITY,
AND TEMPERATURE
STATION S3.5, 60% DEPTH
02/07/93 - 03/05/93



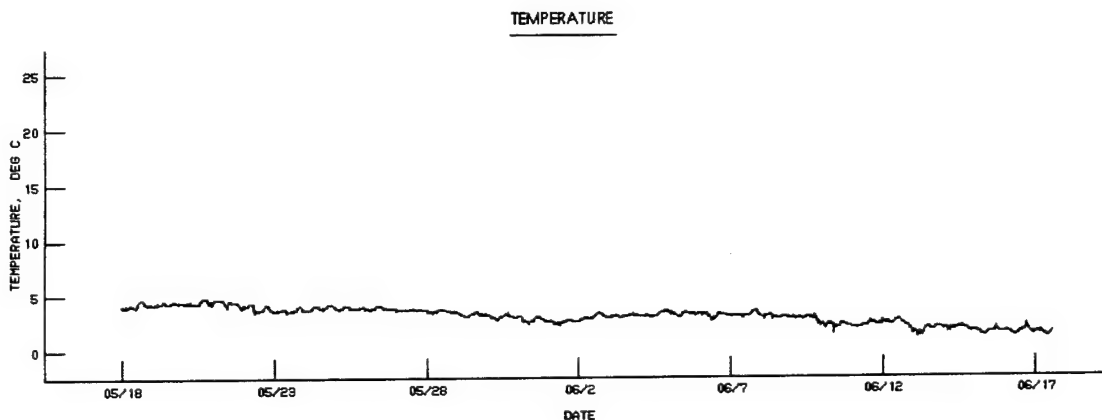
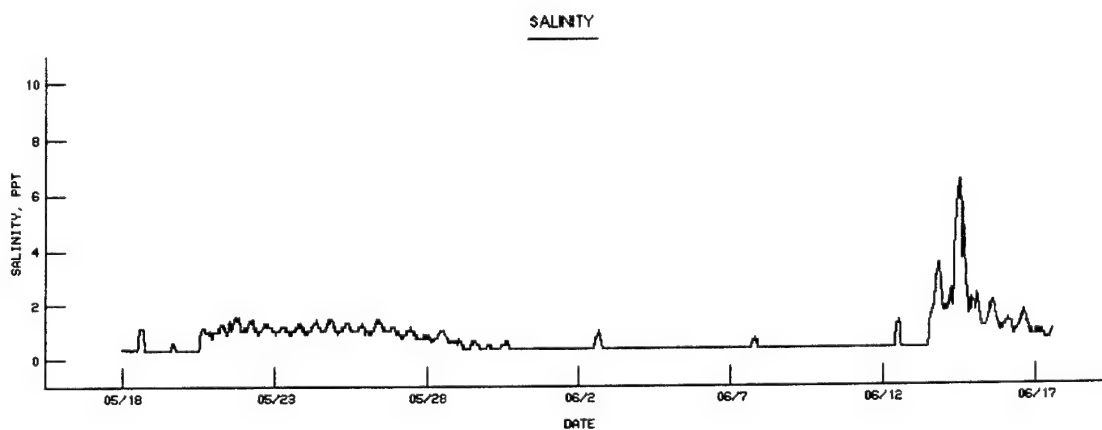
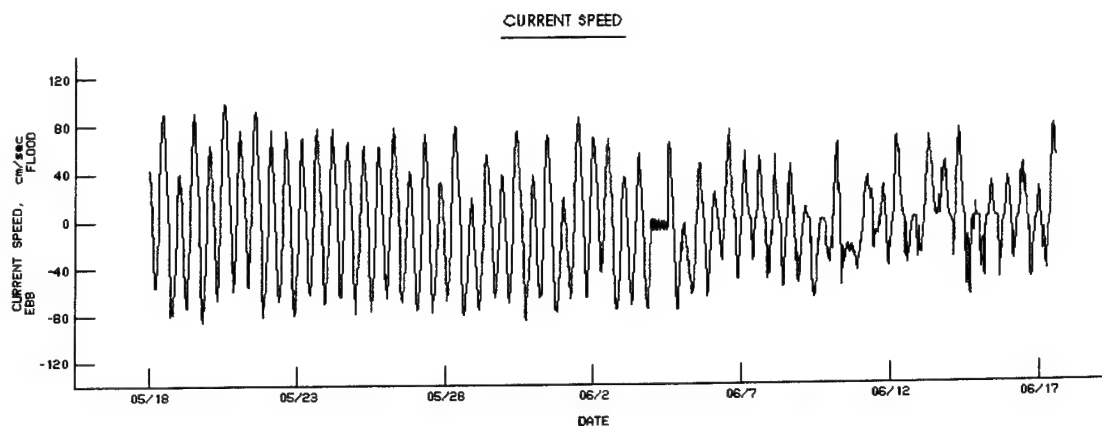
CURRENT SPEED, SALINITY,
AND TEMPERATURE
STATION S3.5, 60% DEPTH
03/05/93 - 04/04/93



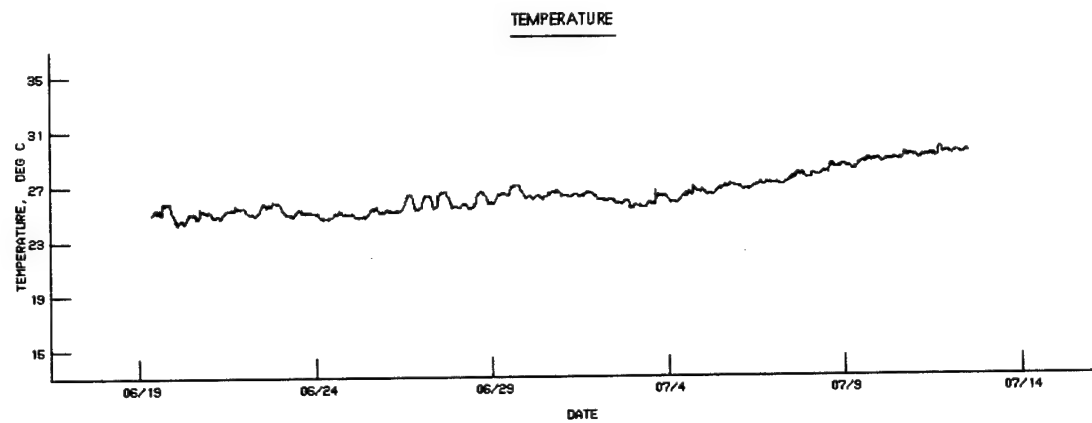
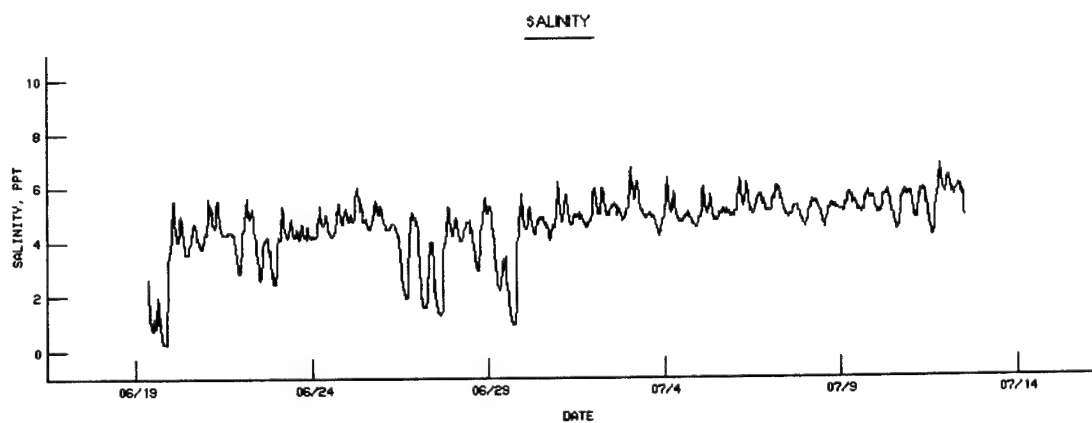
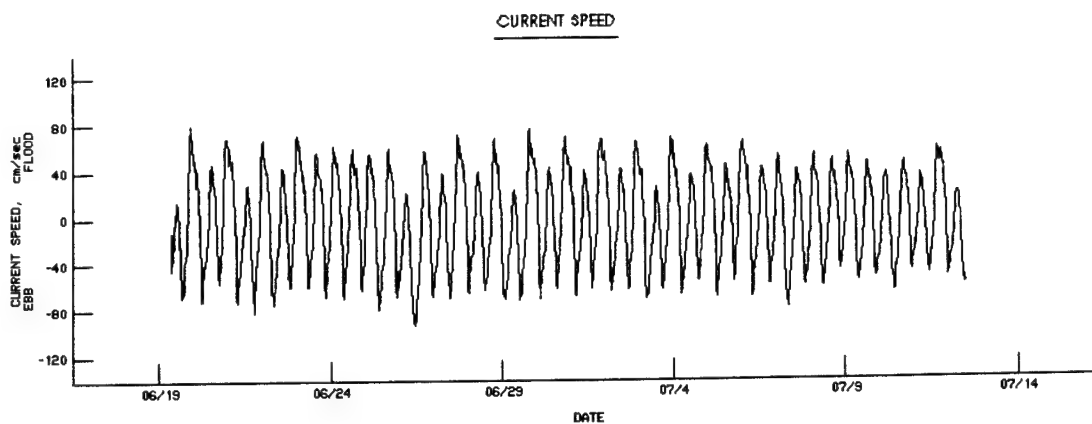
CURRENT SPEED, SALINITY,
AND TEMPERATURE
STATION S3.5, 60% DEPTH
04/04/93 - 04/18/93



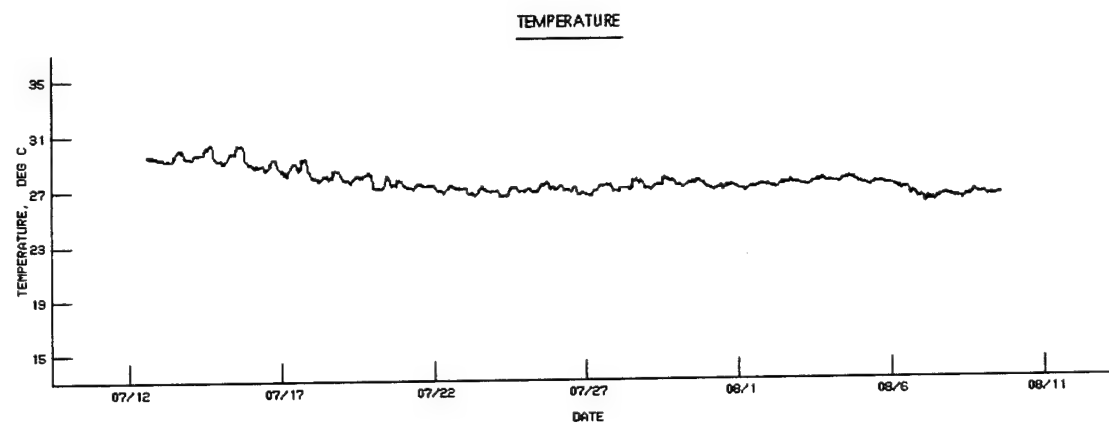
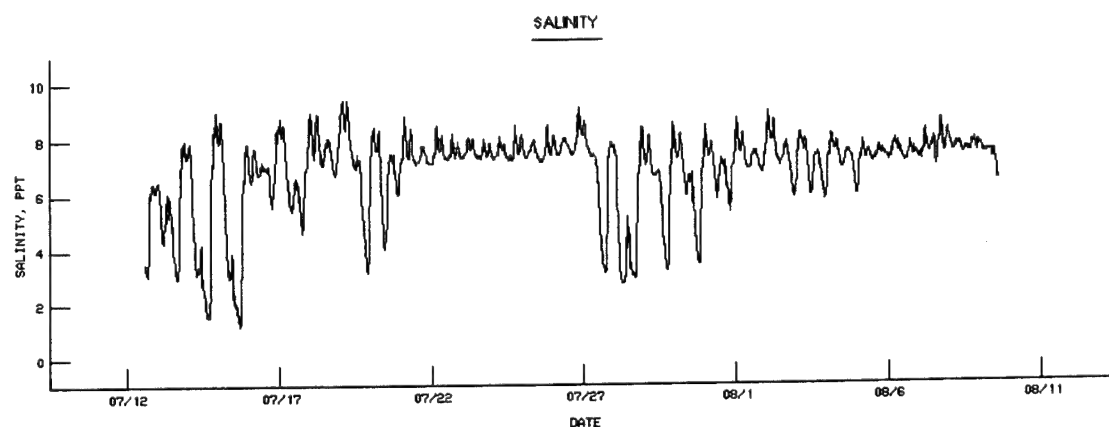
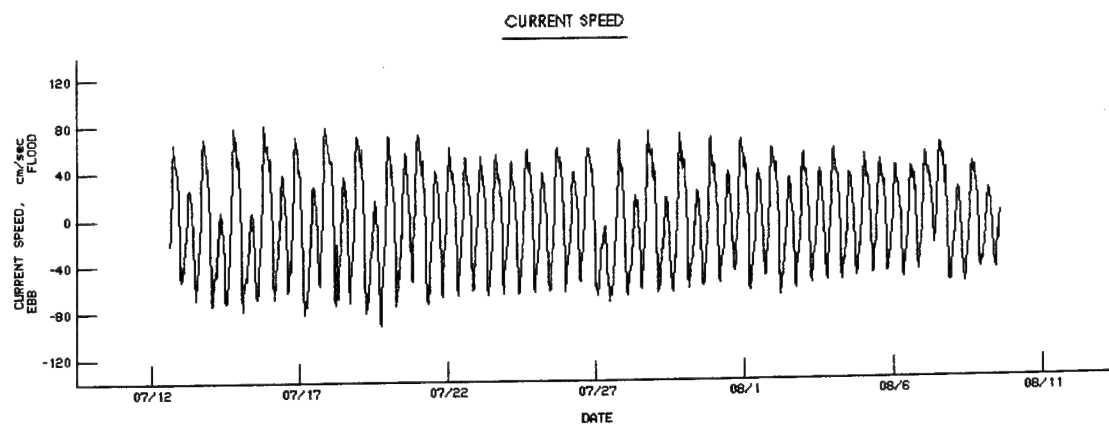
CURRENT SPEED, SALINITY,
AND TEMPERATURE
STATION S3.5, 60% DEPTH
04/17/93 - 05/18/93



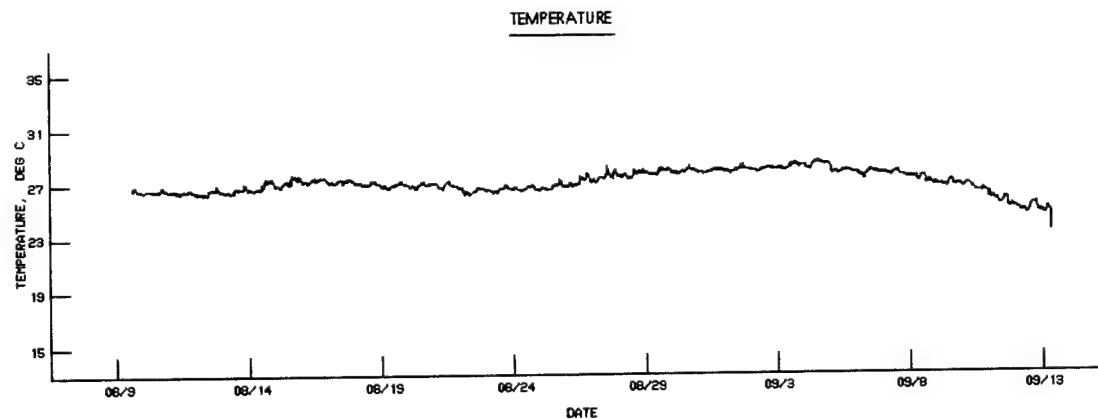
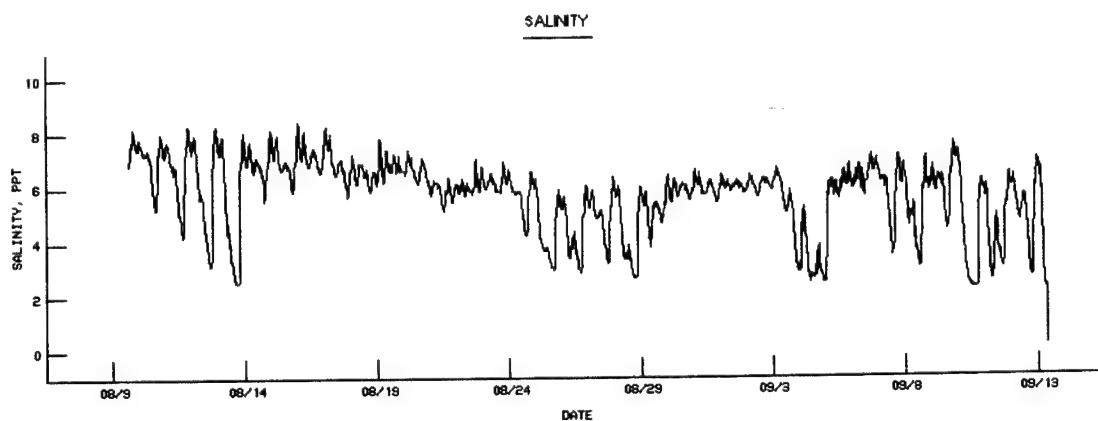
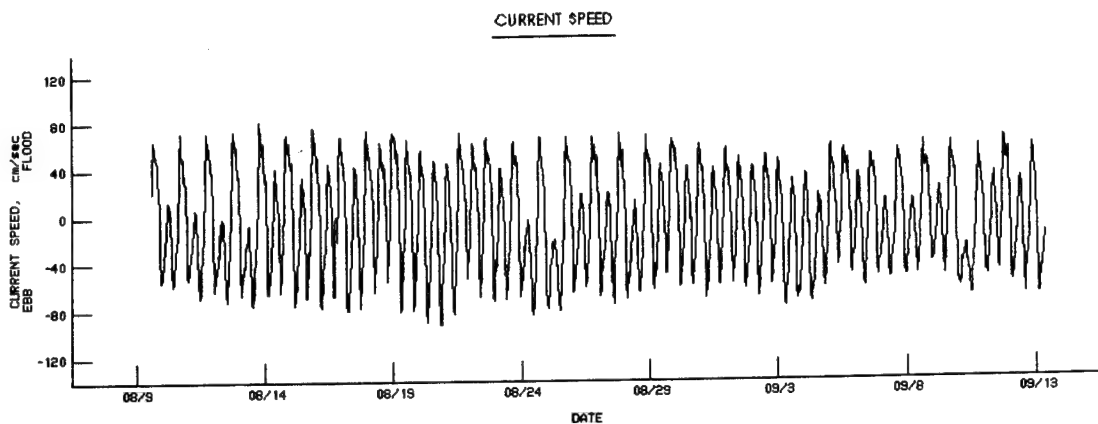
CURRENT SPEED, SALINITY,
AND TEMPERATURE
STATION S3.5, 60% DEPTH
05/18/93 - 06/19/93



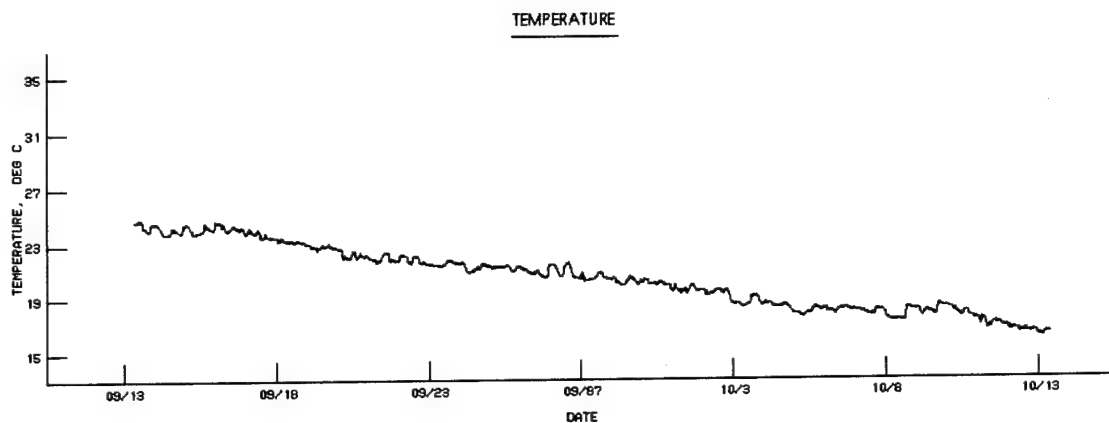
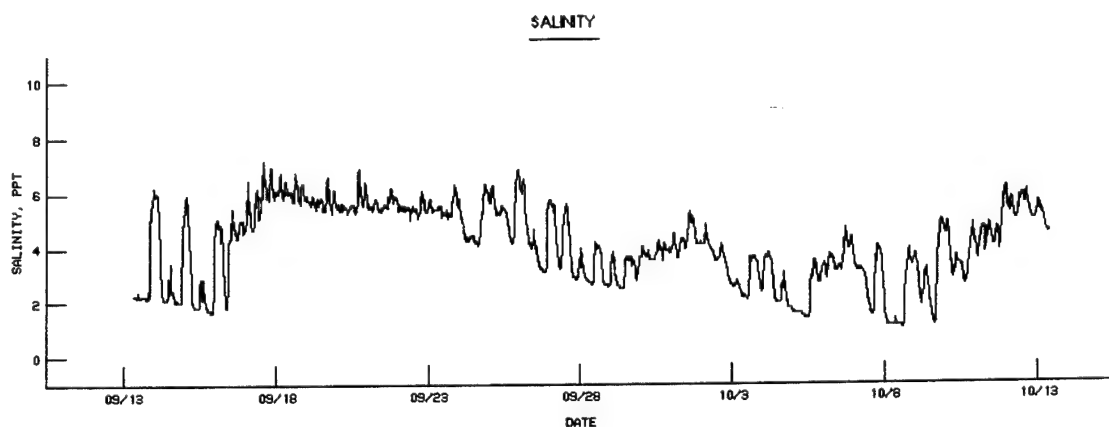
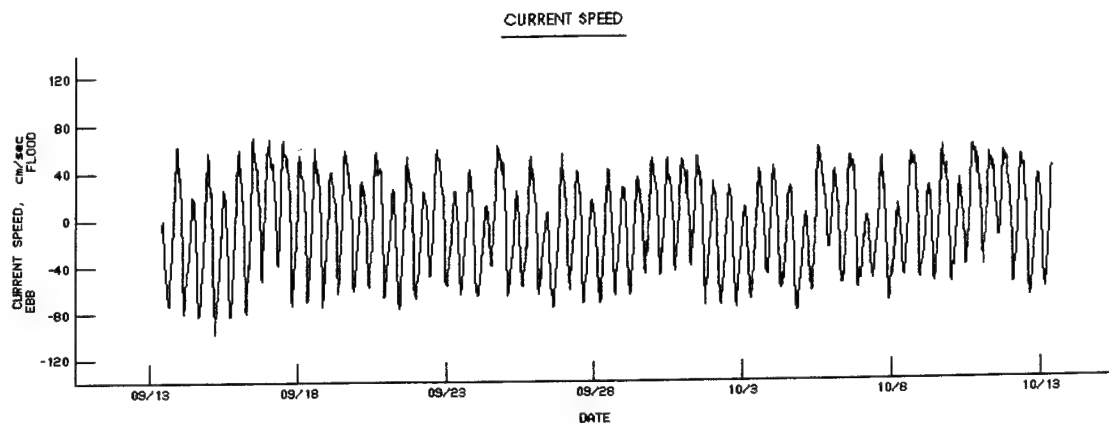
CURRENT SPEED, SALINITY,
AND TEMPERATURE
STATION S3.5, 60% DEPTH
06/19/93 - 07/12/93



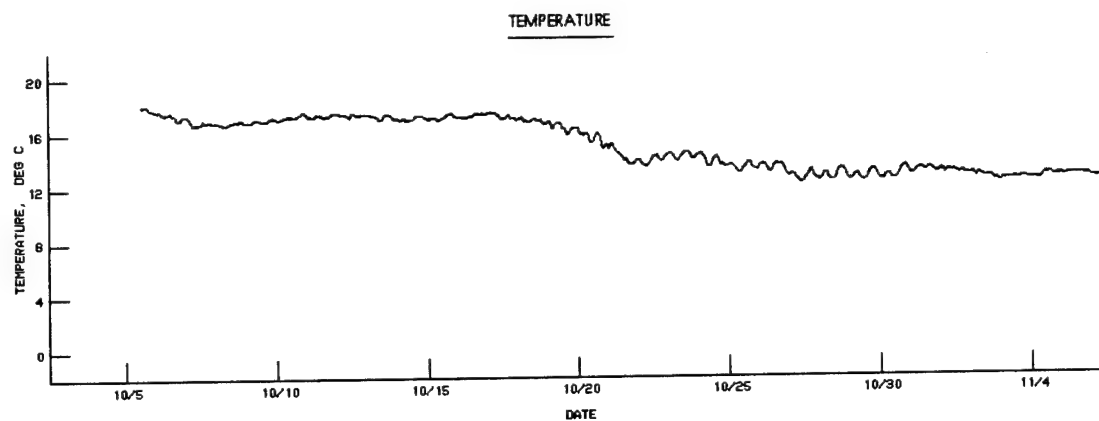
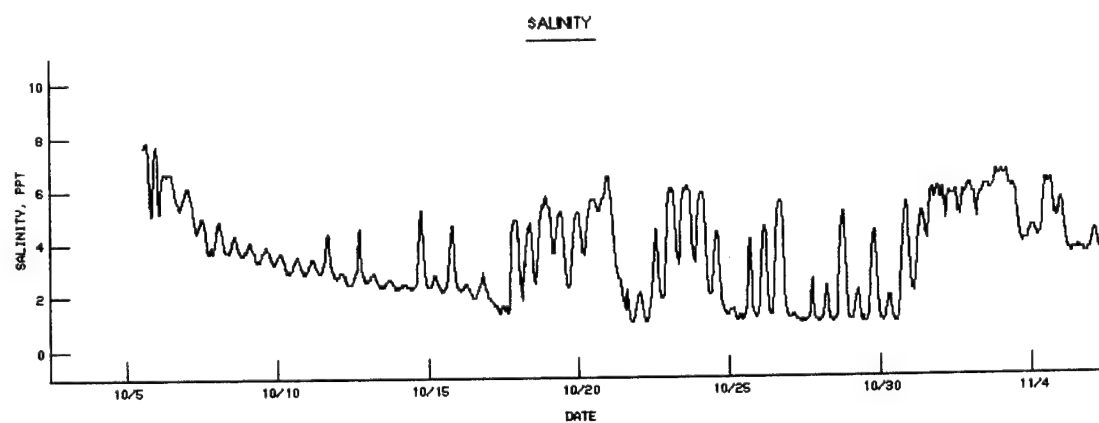
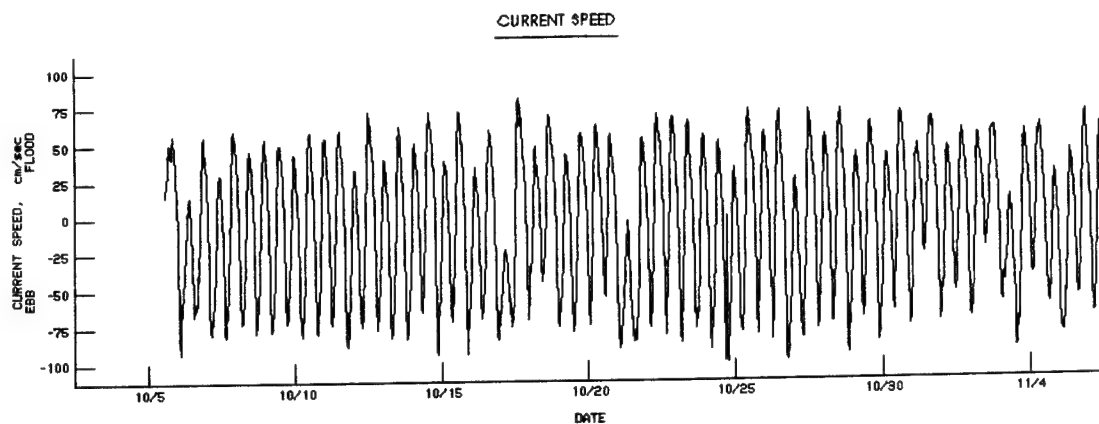
CURRENT SPEED, SALINITY,
AND TEMPERATURE
STATION S3.5, 60% DEPTH
07/12/93 - 08/9/93



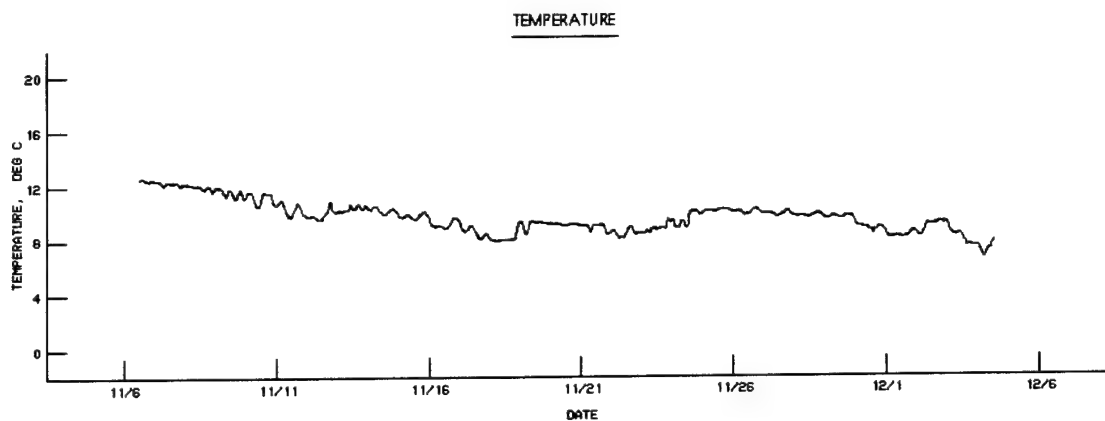
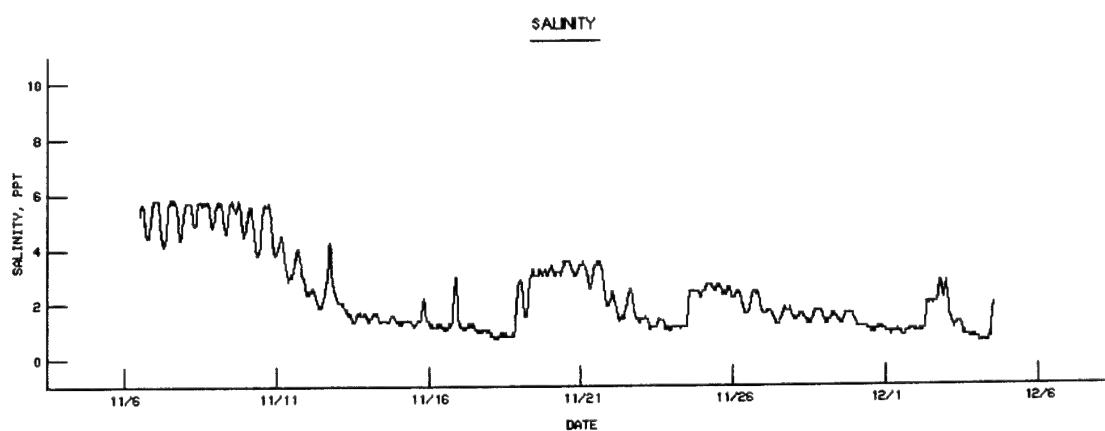
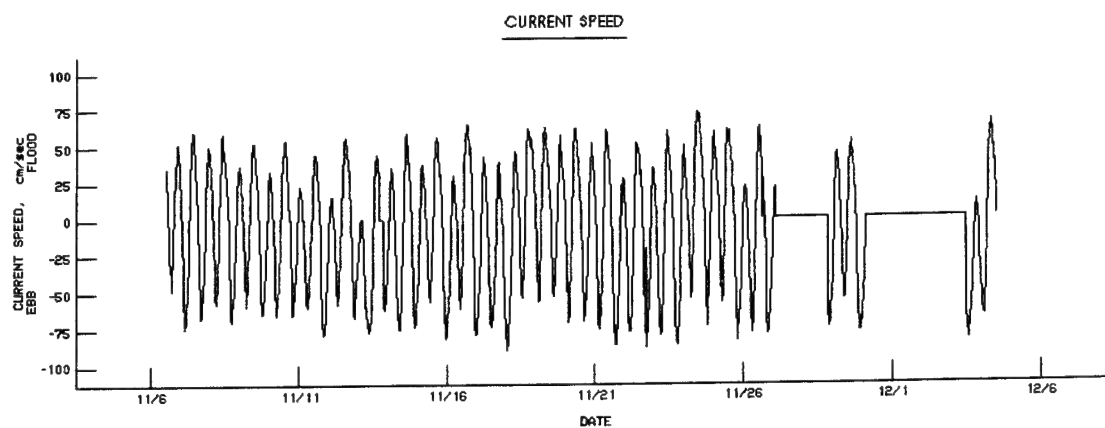
**CURRENT SPEED, SALINITY,
AND TEMPERATURE
STATION S3.5, 60% DEPTH
08/9/93 - 09/13/93**



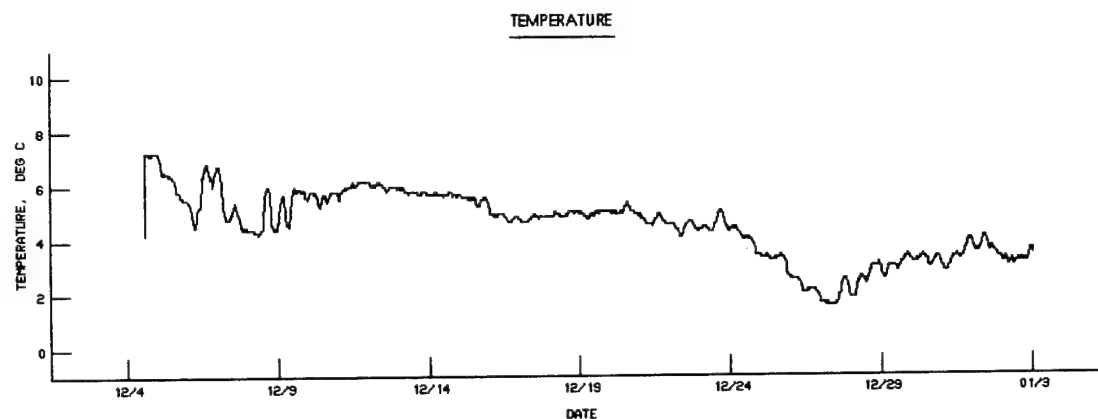
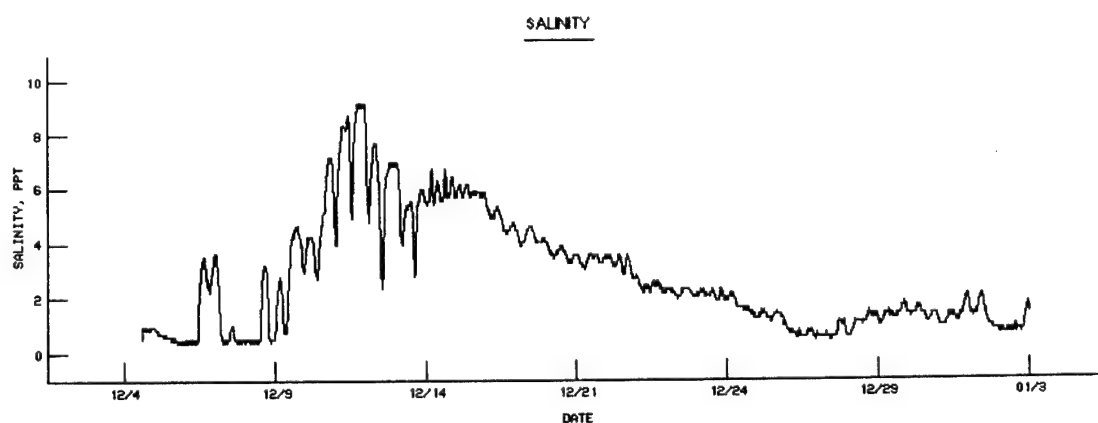
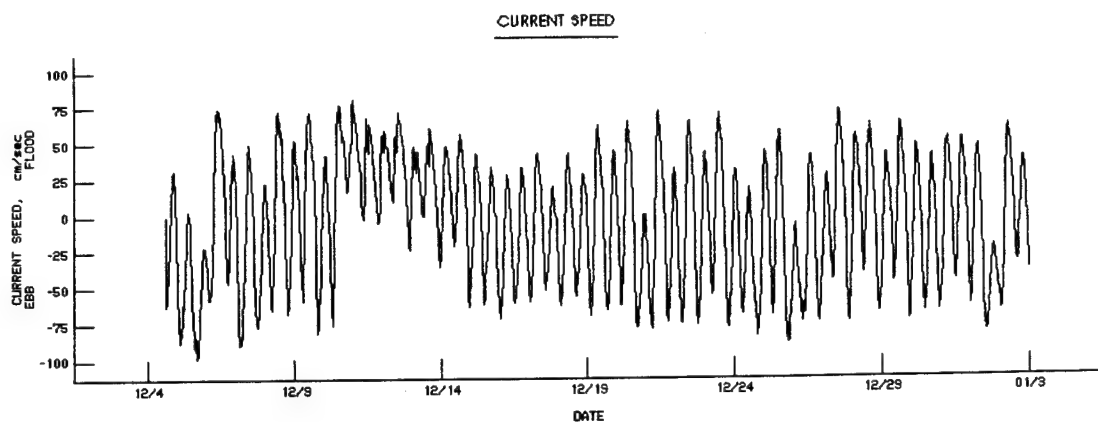
CURRENT SPEED, SALINITY,
AND TEMPERATURE
STATION S3.5, 60% DEPTH
09/13/93 - 10/13/93



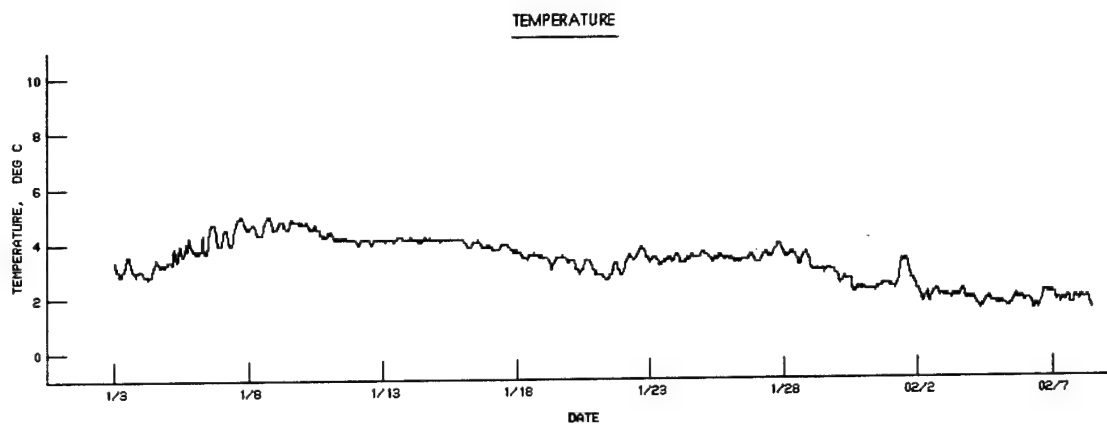
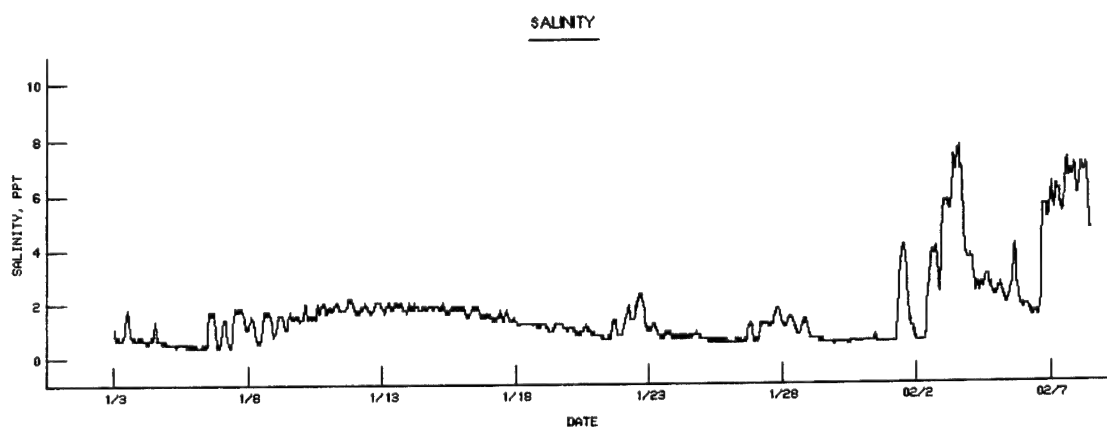
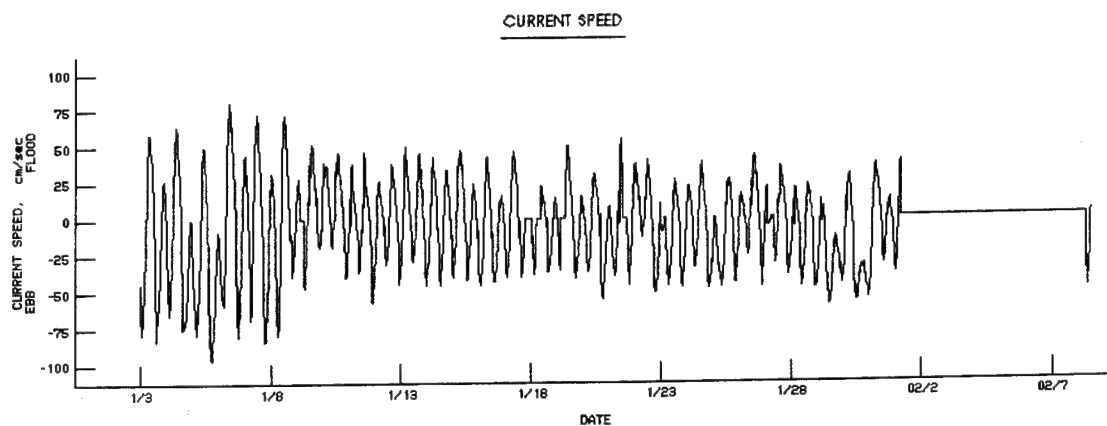
CURRENT SPEED, SALINITY,
AND TEMPERATURE
STATION S3.9, 60% DEPTH
10/05/92 - 11/06/92



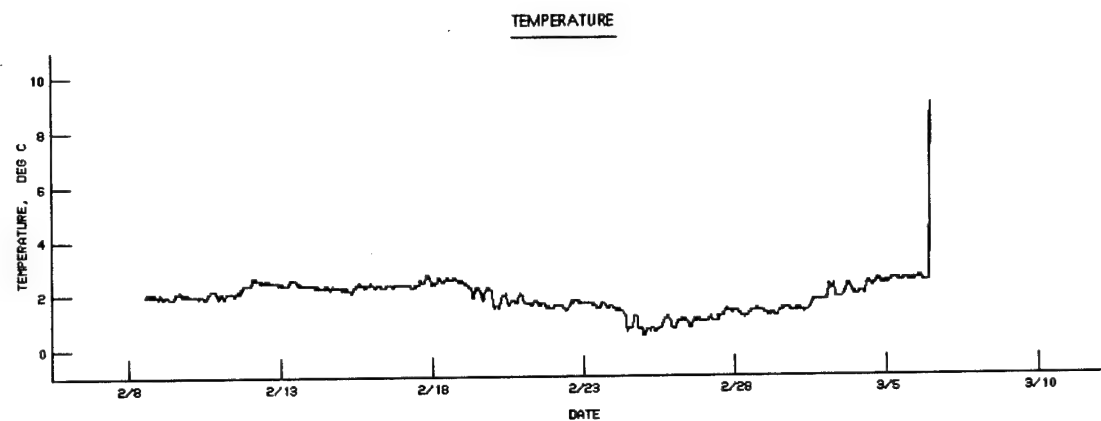
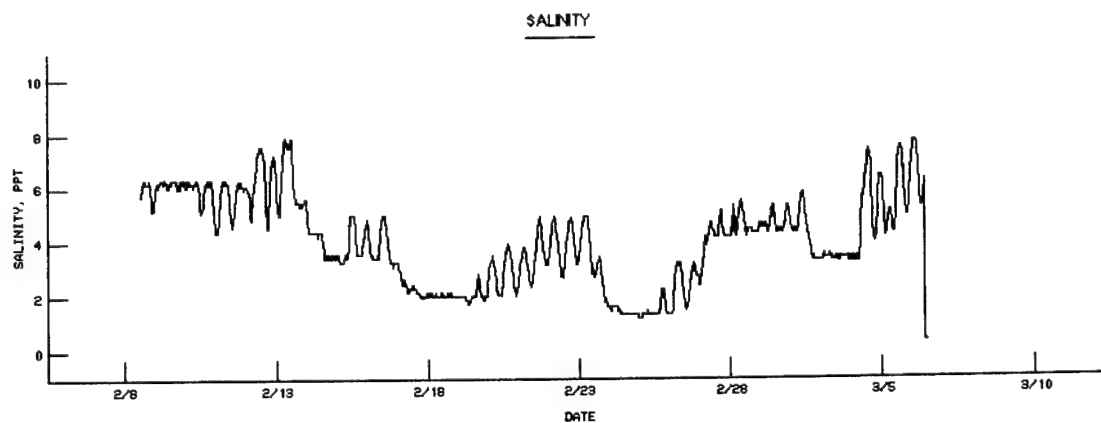
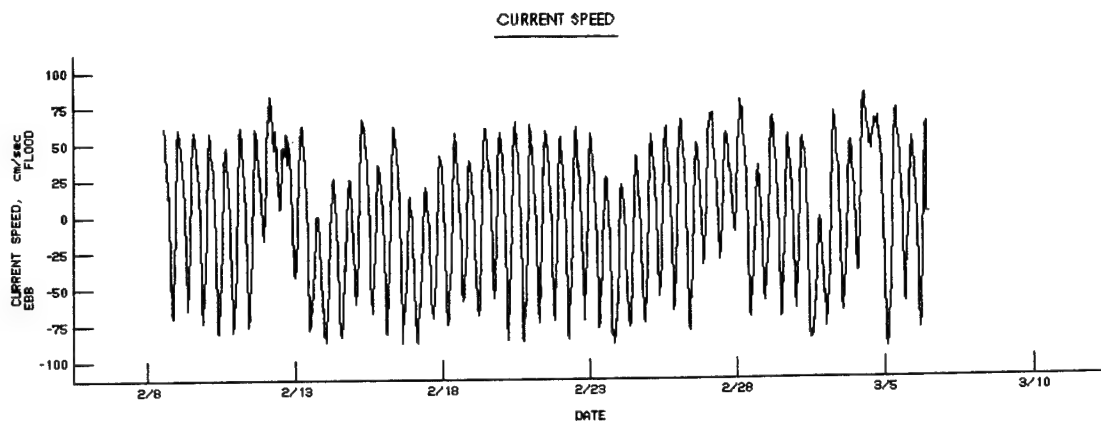
CURRENT SPEED, SALINITY,
AND TEMPERATURE
STATION S3.9, 60% DEPTH
11/06/92 - 12/04/92



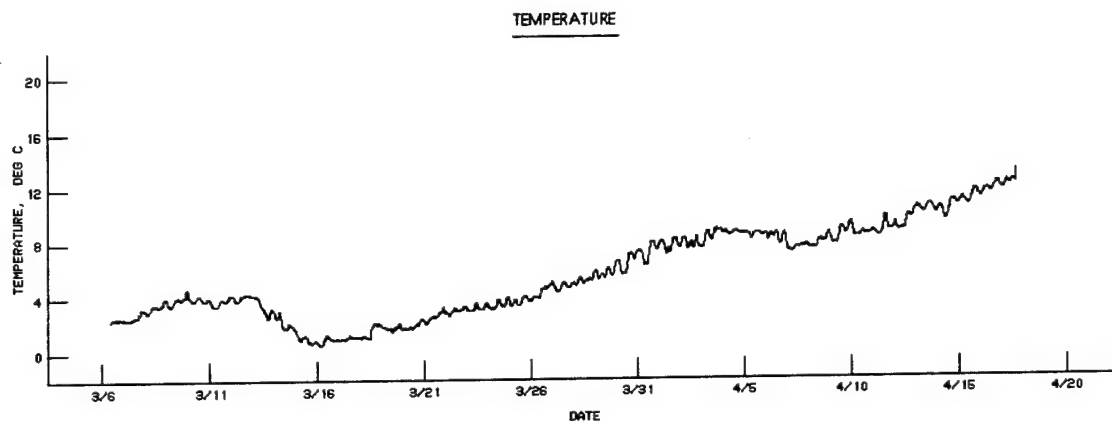
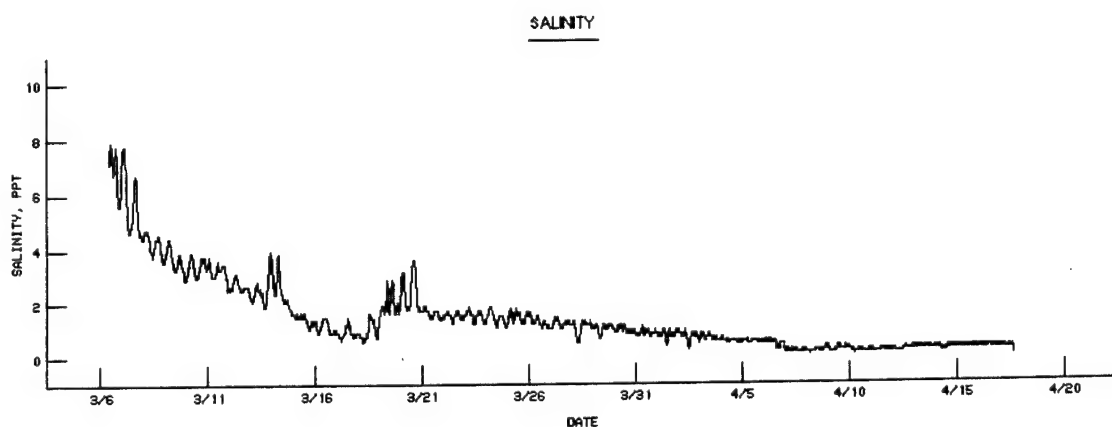
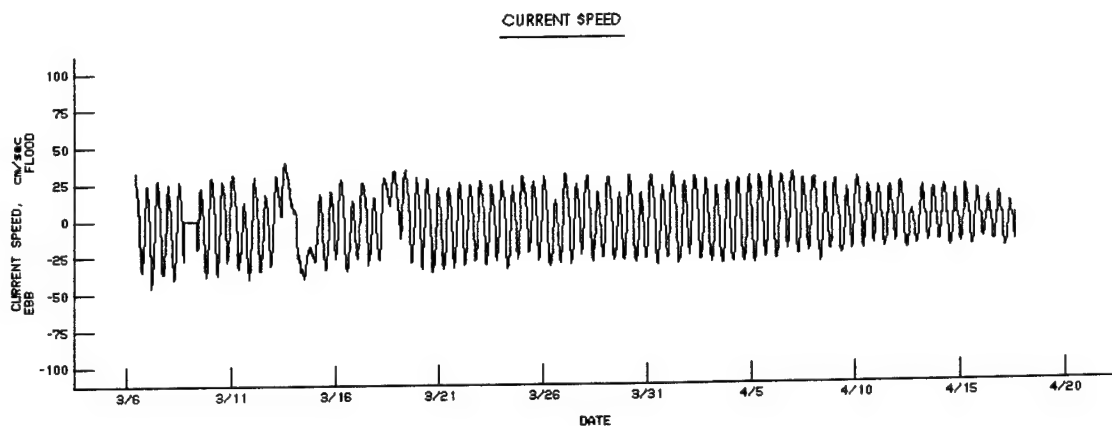
CURRENT SPEED, SALINITY,
AND TEMPERATURE
STATION S3.9, 60% DEPTH
12/04/92 - 01/03/93



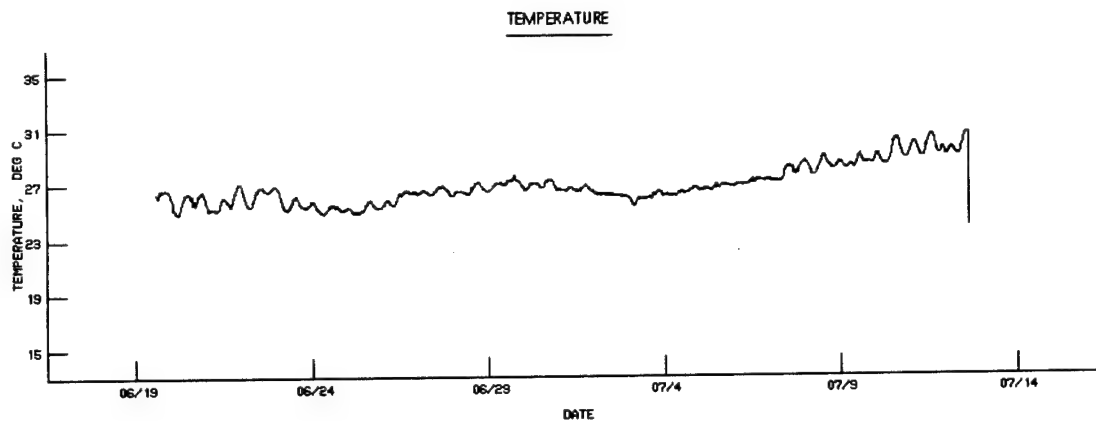
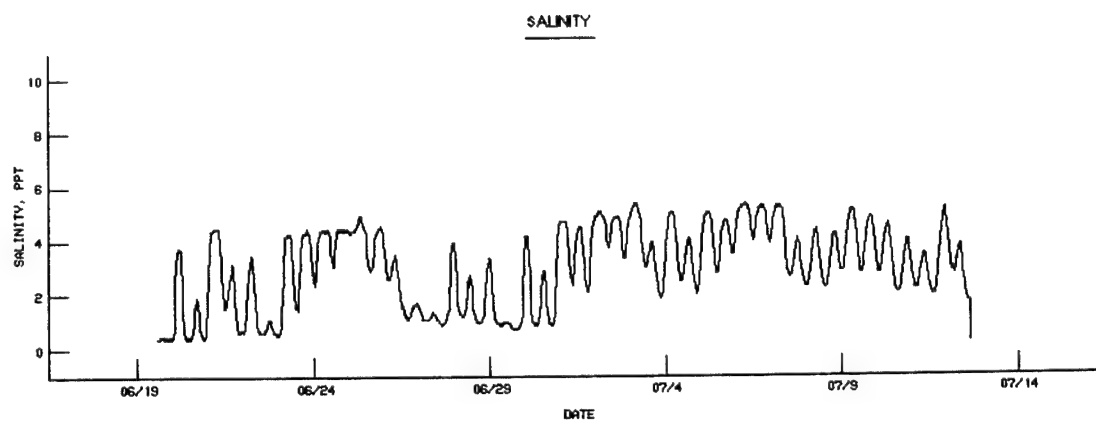
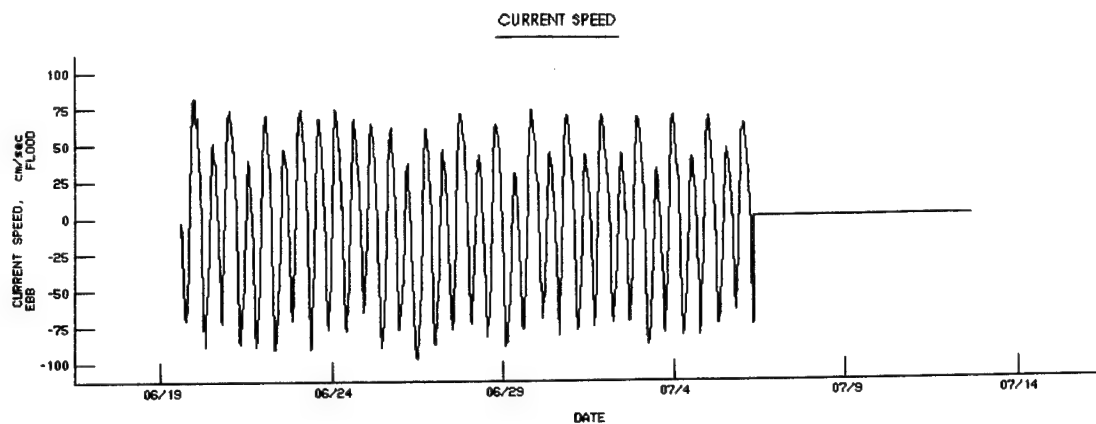
CURRENT SPEED, SALINITY,
AND TEMPERATURE
STATION S3.9, 60% DEPTH
01/03/93 - 02/08/93



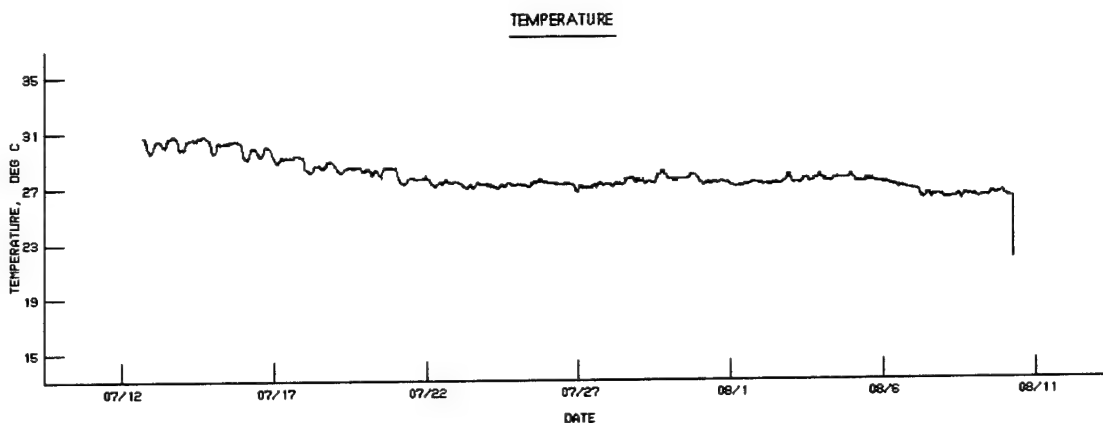
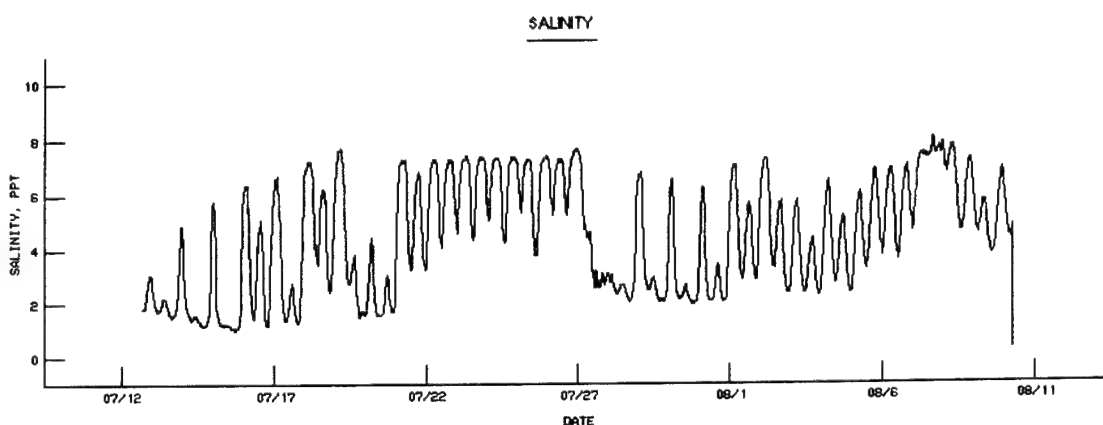
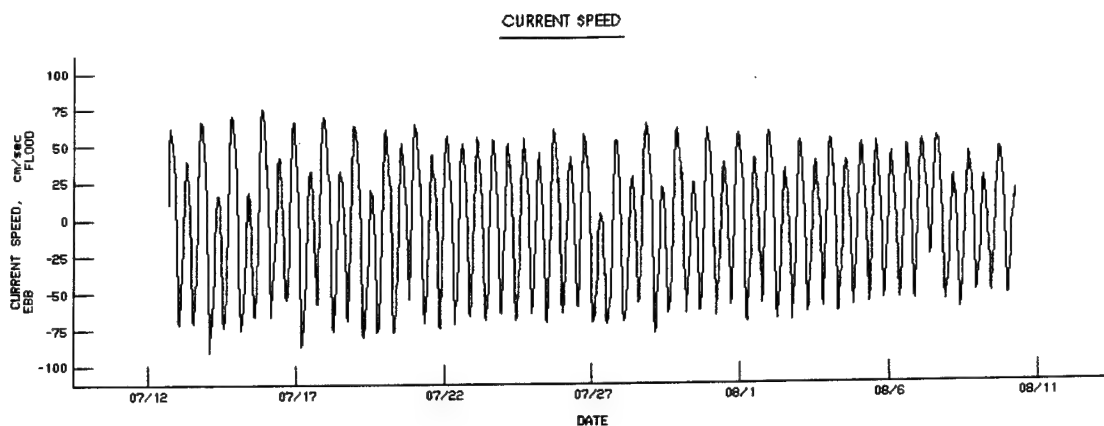
CURRENT SPEED, SALINITY,
AND TEMPERATURE
STATION S3.9, 60% DEPTH
02/08/93 - 03/06/93



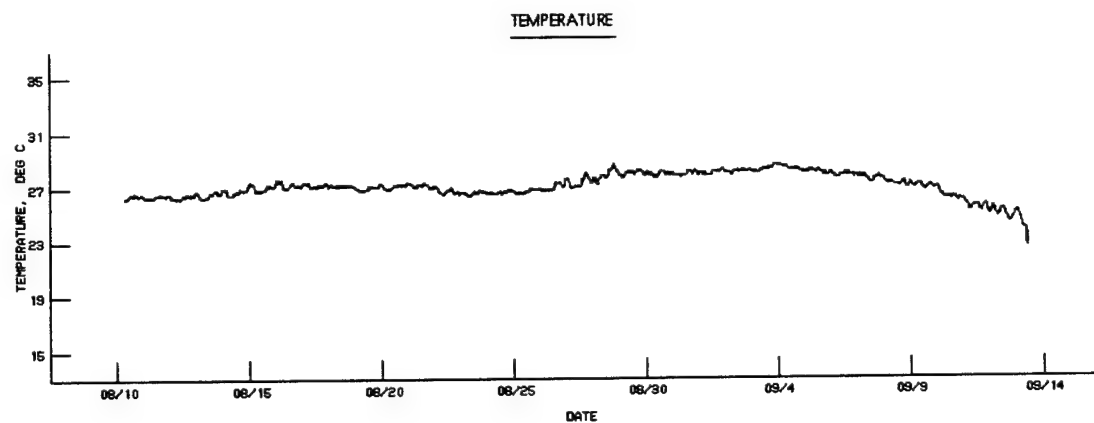
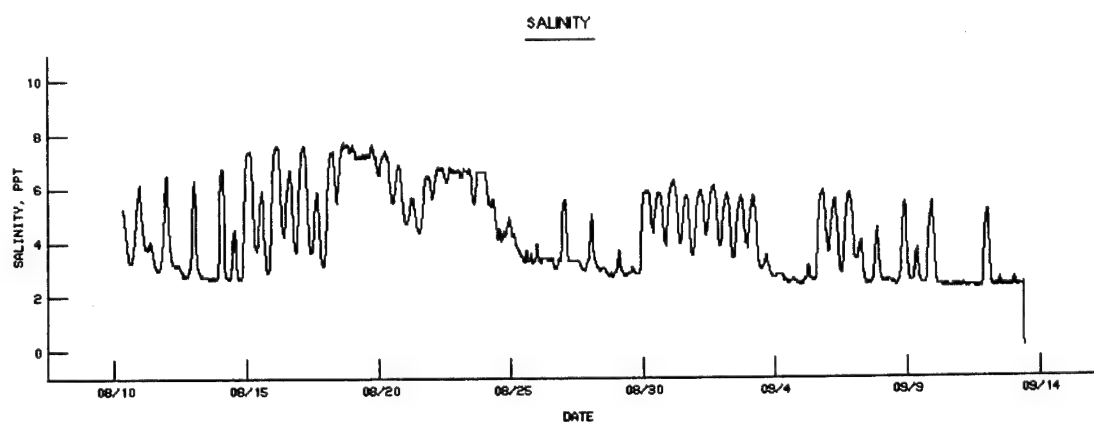
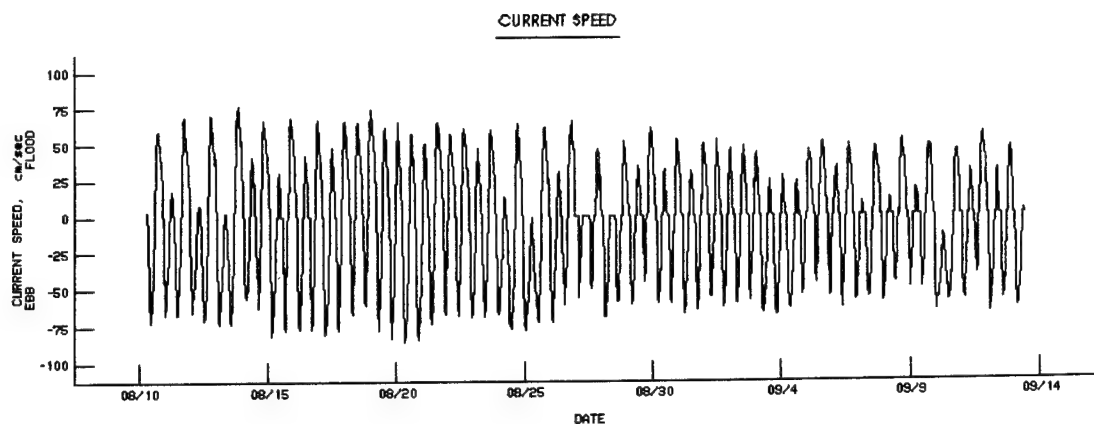
CURRENT SPEED, SALINITY,
AND TEMPERATURE
STATION S3.9, 60% DEPTH
03/06/93 - 04/17/93



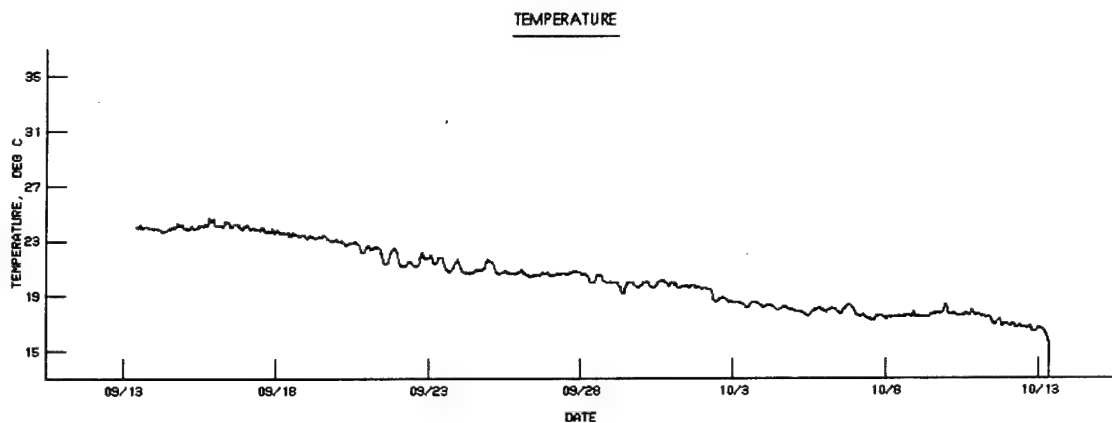
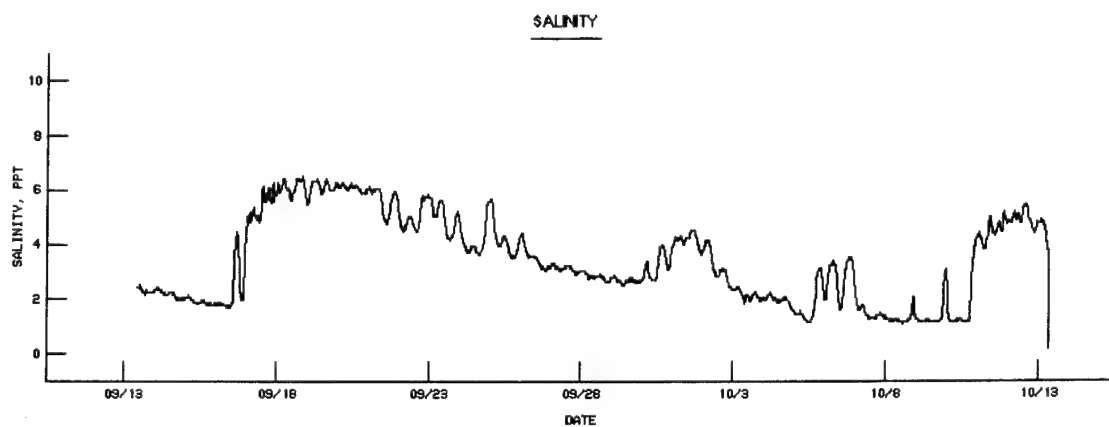
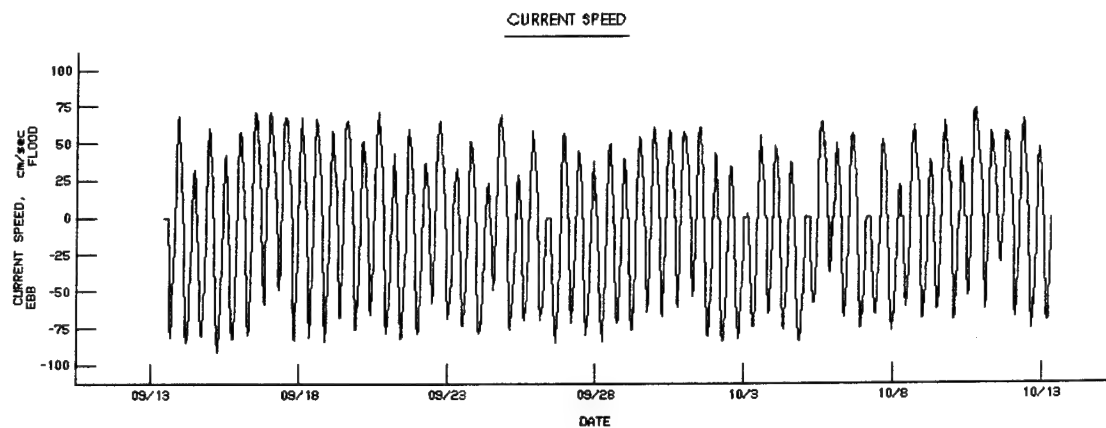
CURRENT SPEED, SALINITY,
AND TEMPERATURE
STATION S3.9, 60% DEPTH
06/19/93 - 07/13/93



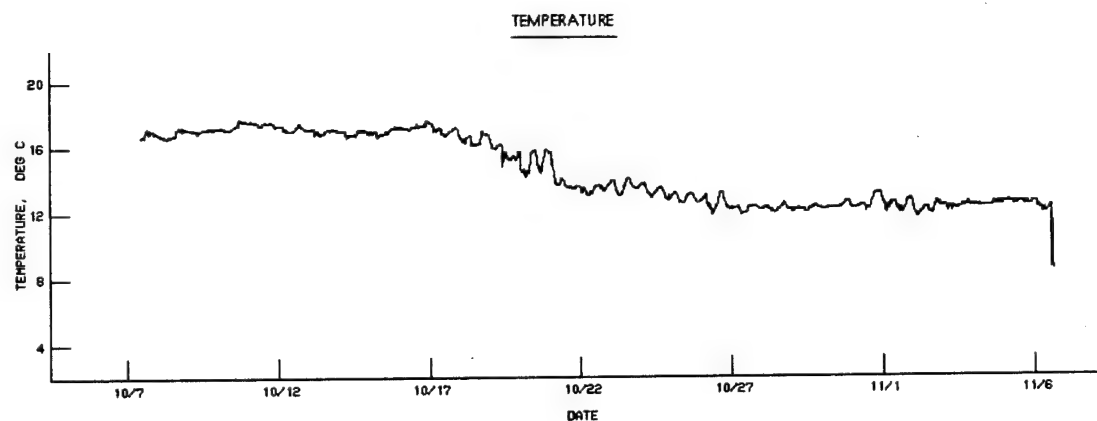
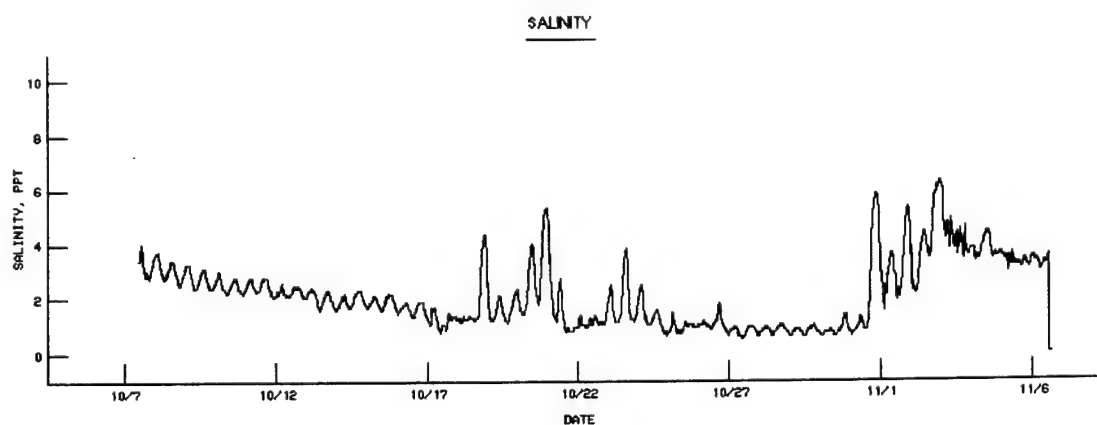
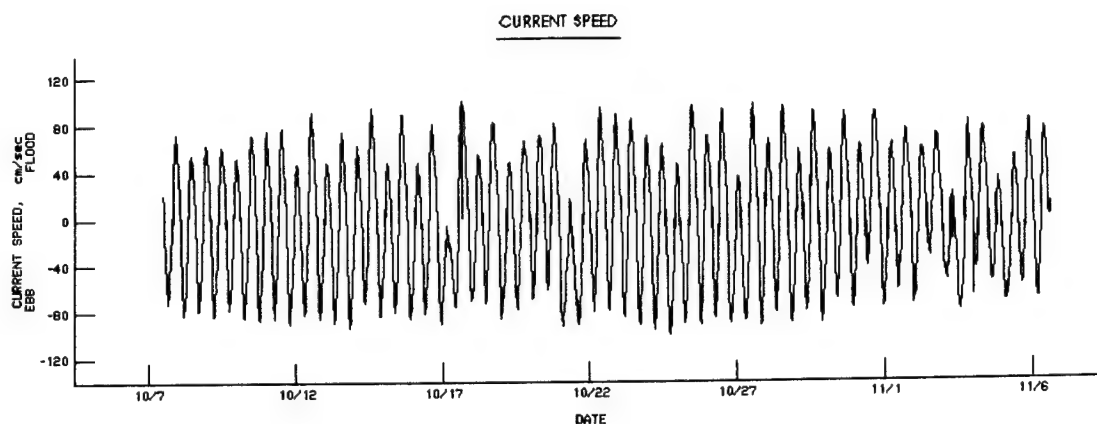
CURRENT SPEED, SALINITY,
AND TEMPERATURE
STATION S3.9, 60% DEPTH
07/12/93 - 08/10/93



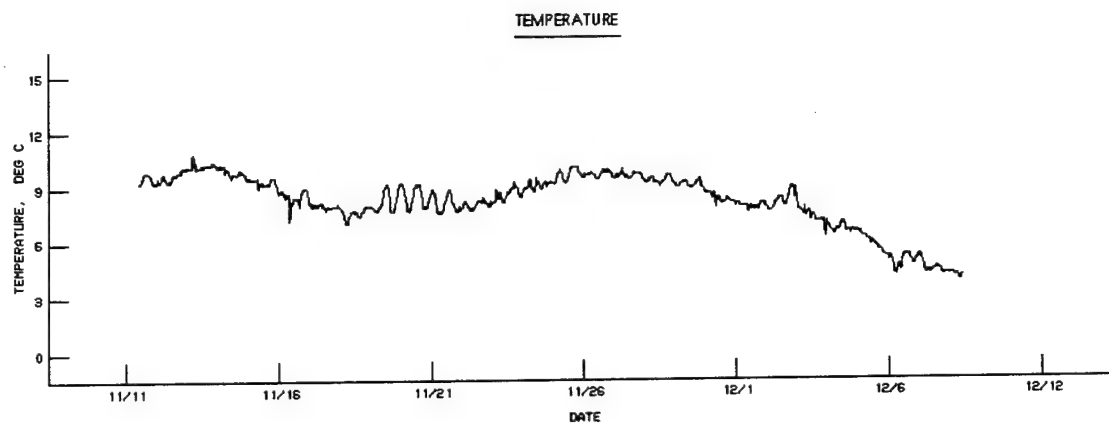
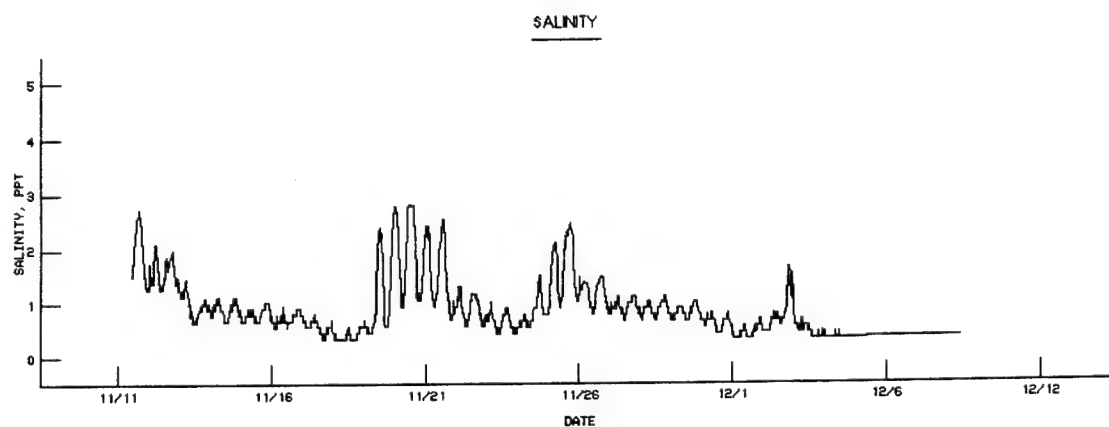
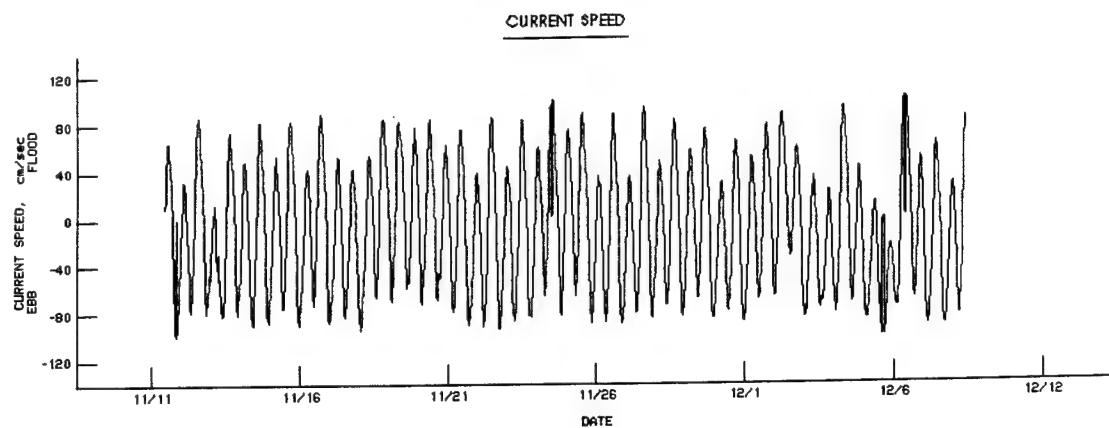
CURRENT SPEED, SALINITY,
AND TEMPERATURE
STATION S3.9, 60% DEPTH
08/10/93 - 09/13/93



CURRENT SPEED, SALINITY,
AND TEMPERATURE
STATION S3.9, 60% DEPTH
09/13/93 - 10/13/93

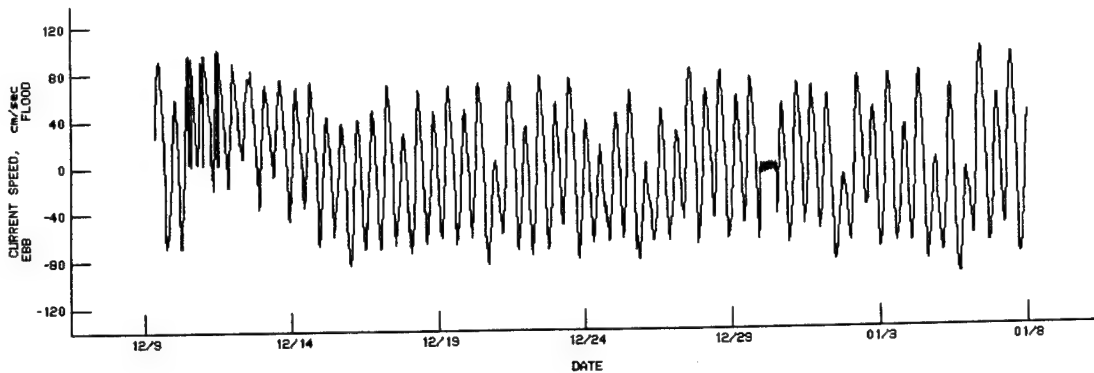


CURRENT SPEED, SALINITY,
AND TEMPERATURE
STATION S4.9, 60% DEPTH
10/07/92 - 11/06/92

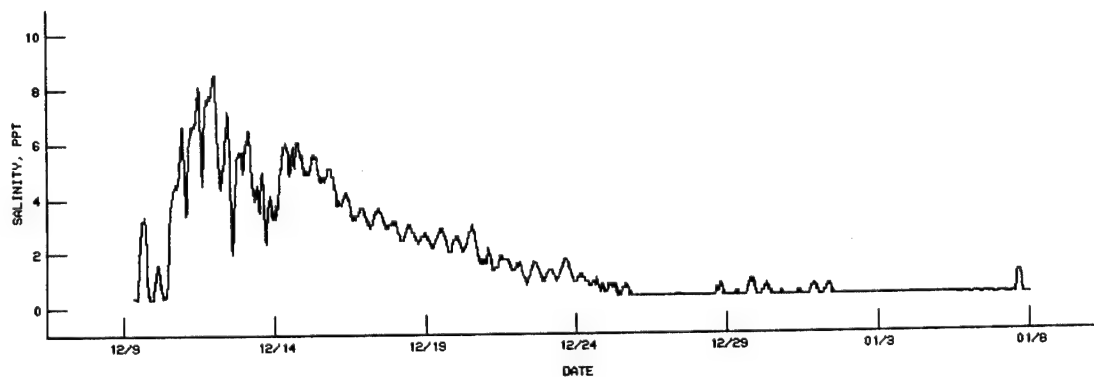


CURRENT SPEED, SALINITY,
AND TEMPERATURE
STATION S4.9, 60% DEPTH
11/11/92 - 12/08/92

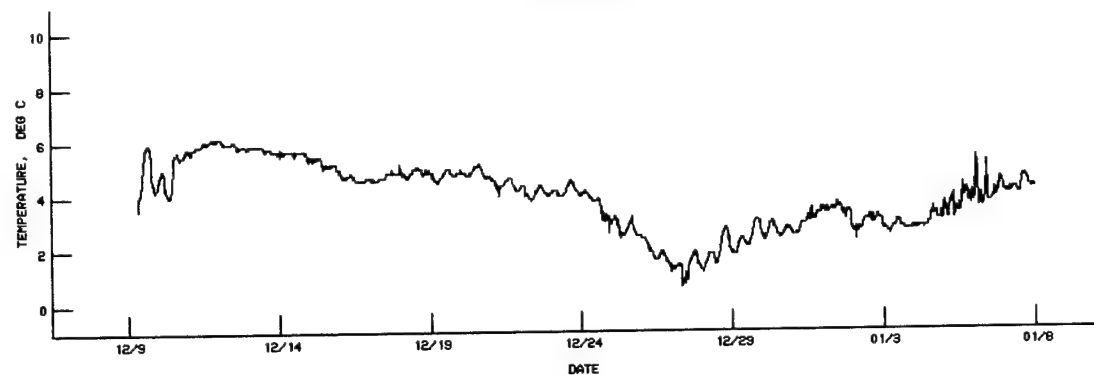
CURRENT SPEED



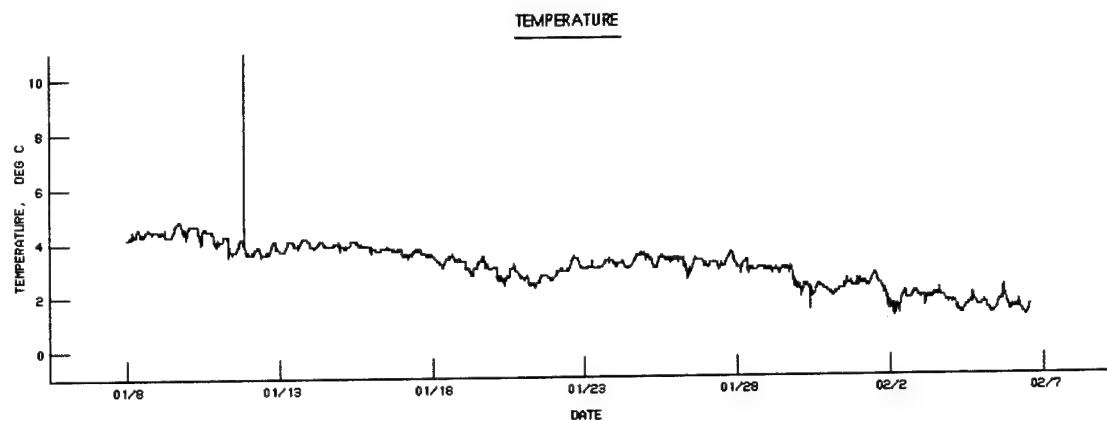
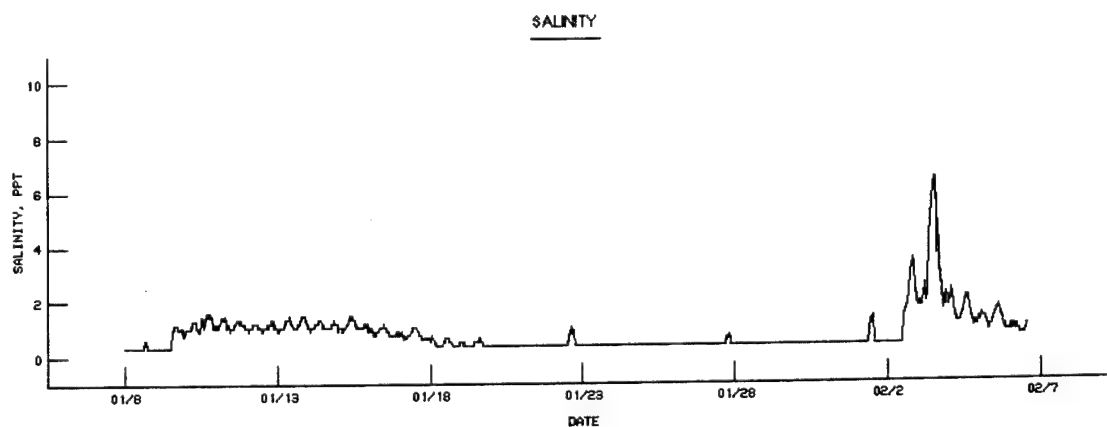
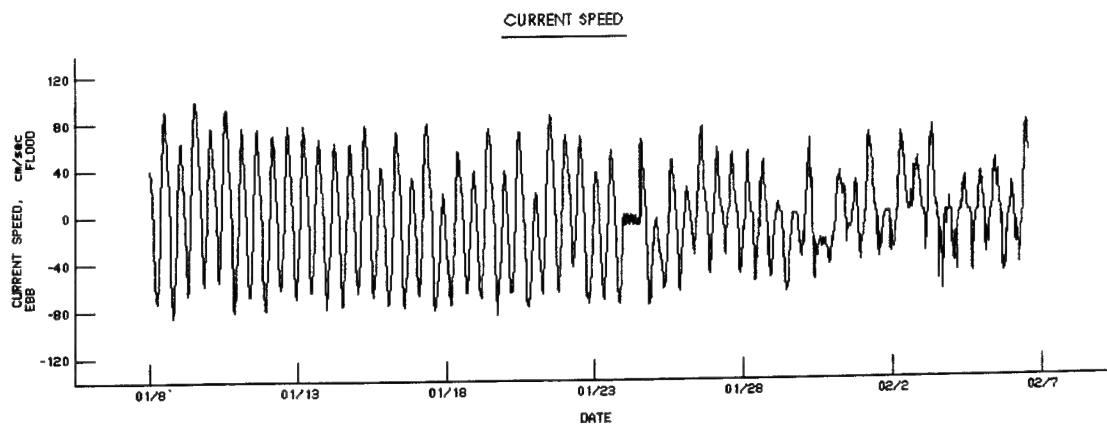
SALINITY



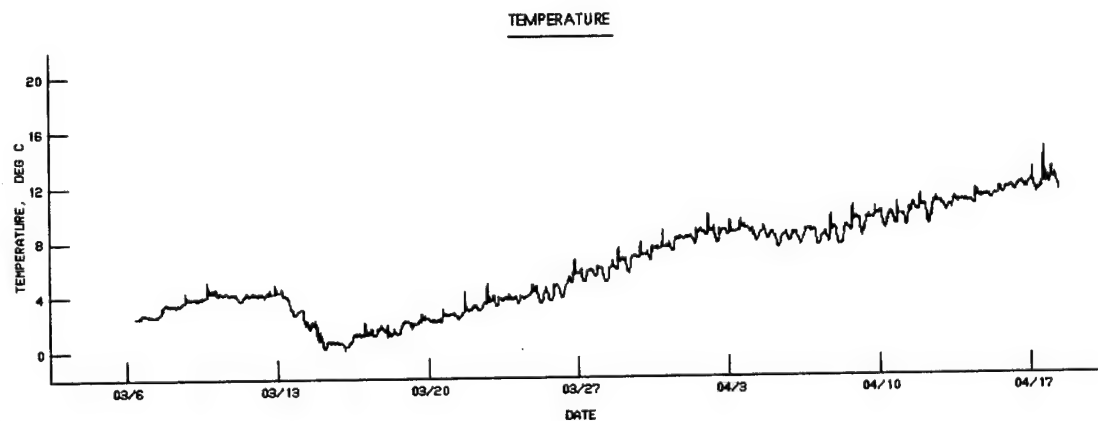
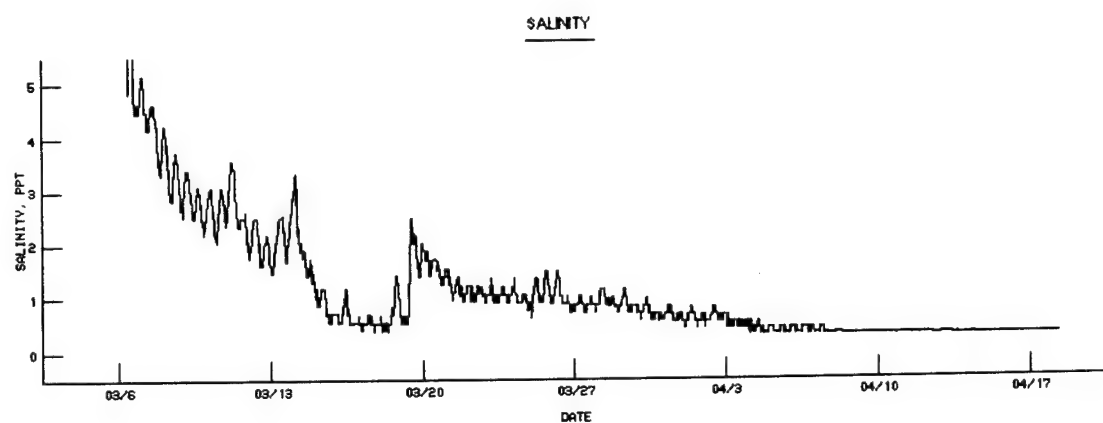
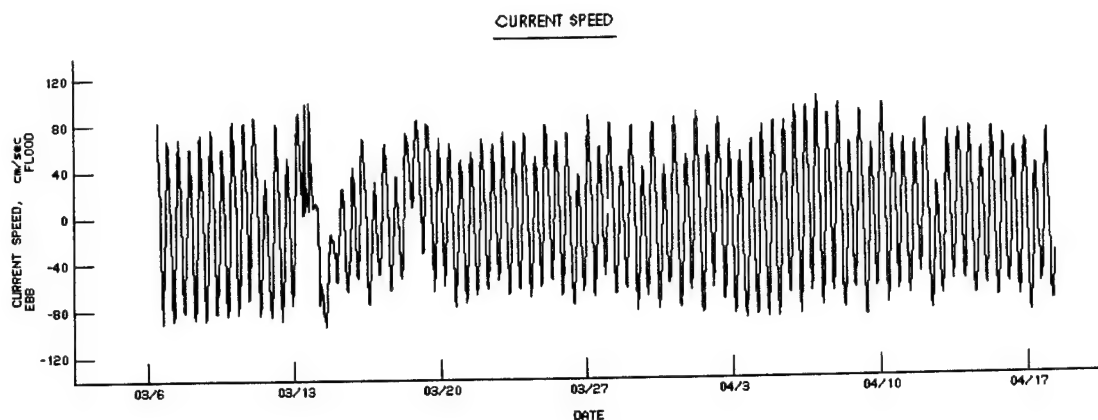
TEMPERATURE



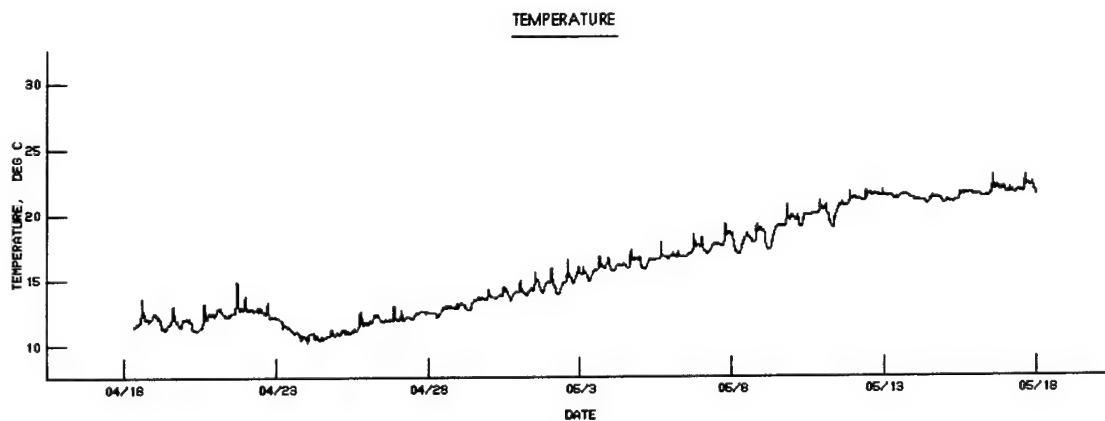
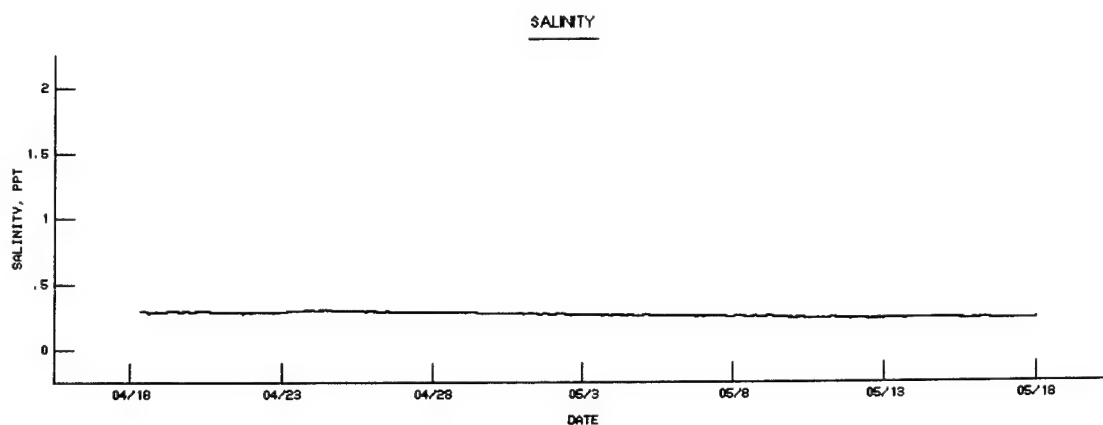
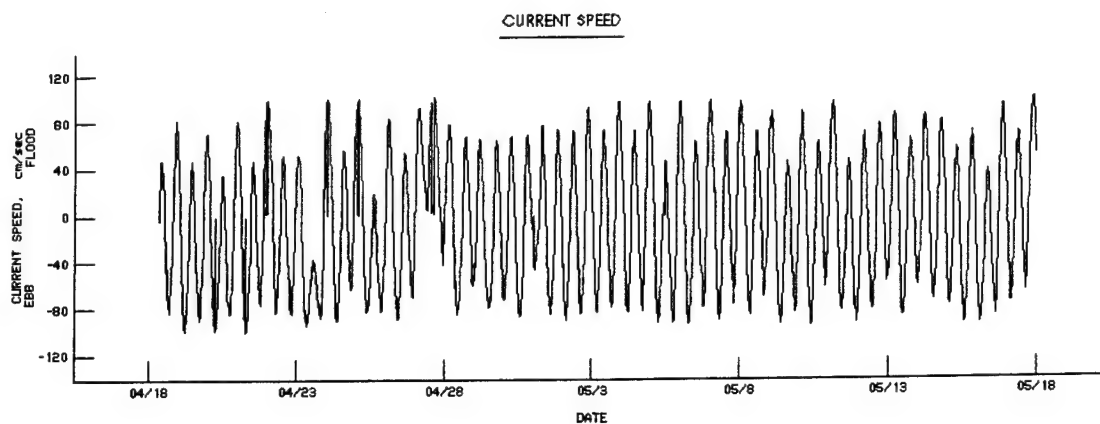
CURRENT SPEED, SALINITY,
AND TEMPERATURE
STATION S4.8, 60% DEPTH
12/09/92 - 01/08/93



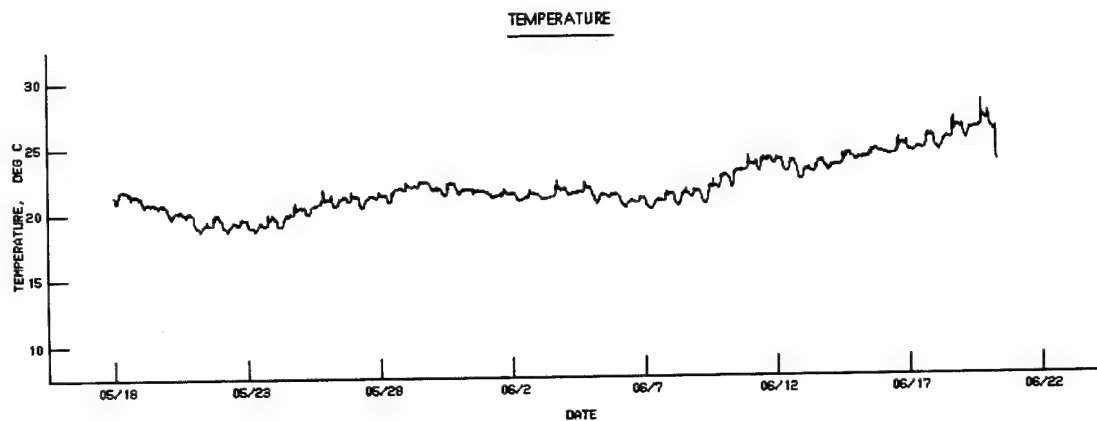
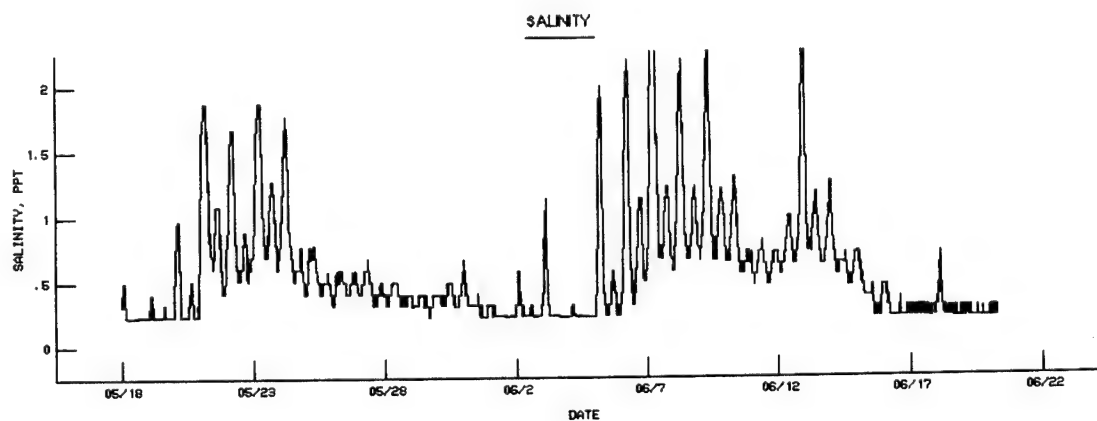
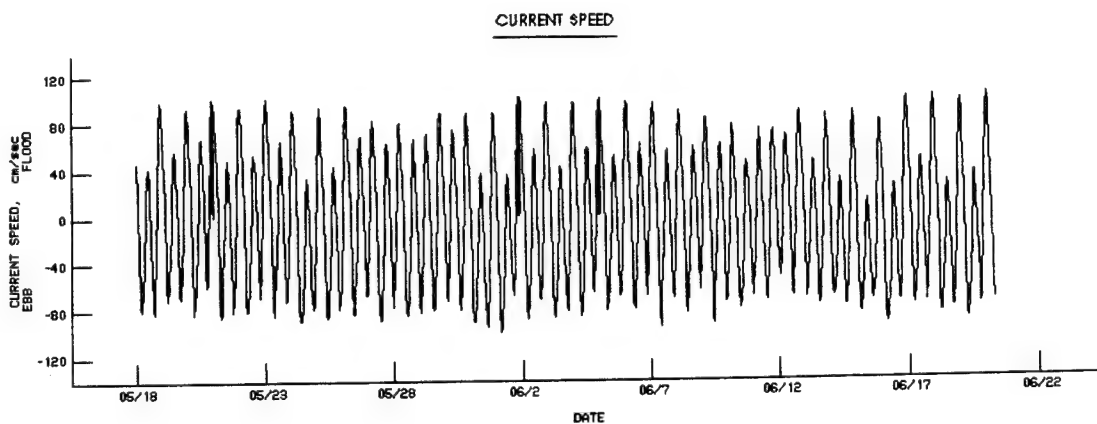
CURRENT SPEED, SALINITY,
AND TEMPERATURE
STATION S4.8, 60% DEPTH
01/08/93 - 02/06/93



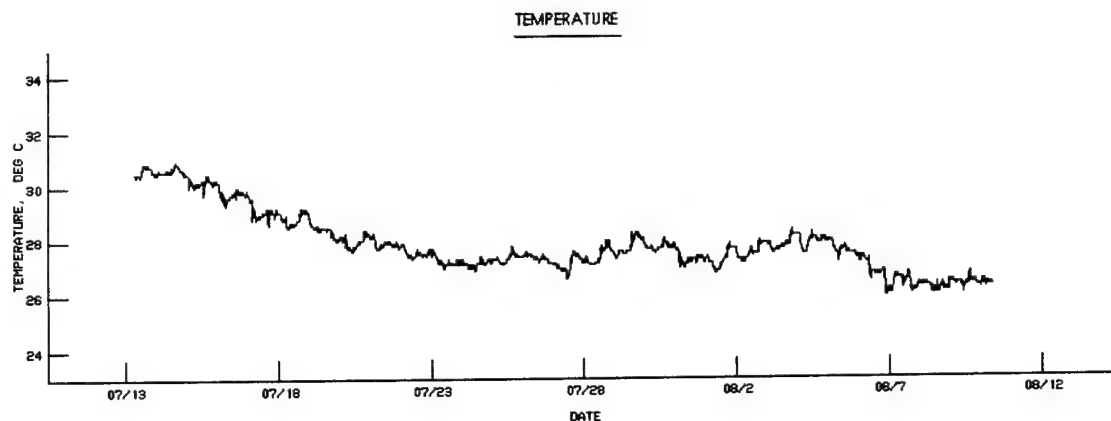
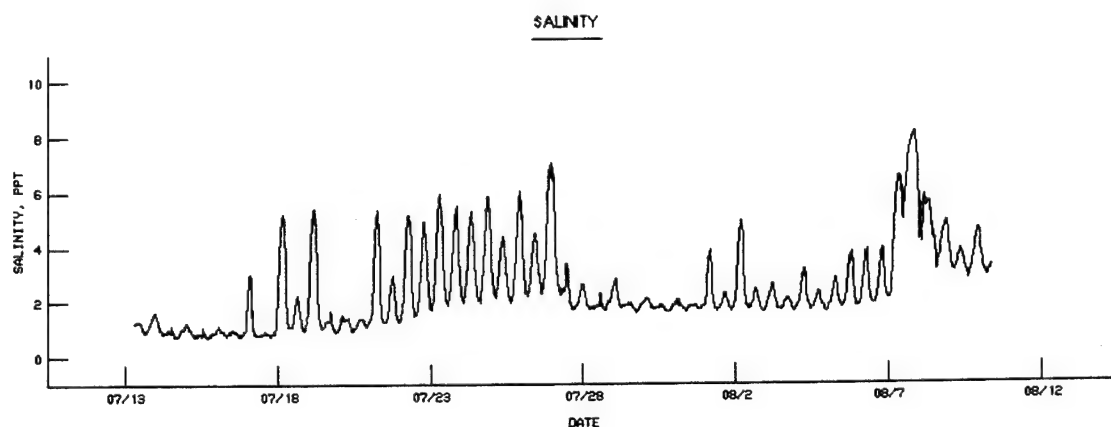
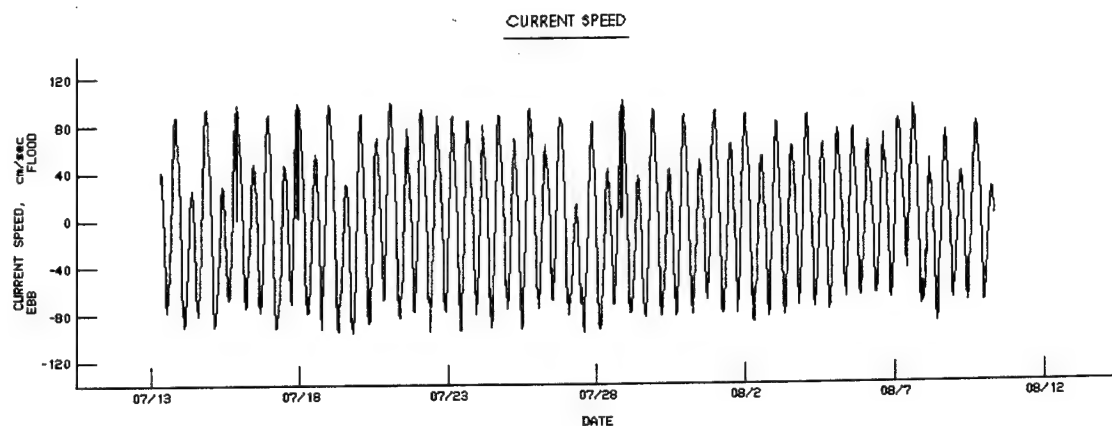
CURRENT SPEED, SALINITY,
AND TEMPERATURE
STATION S4.8, 60% DEPTH
03/06/93 - 04/18/93



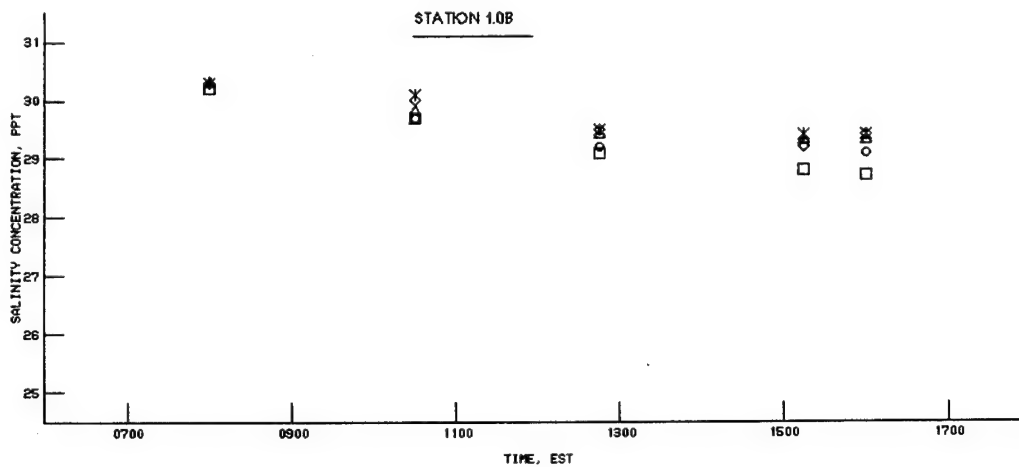
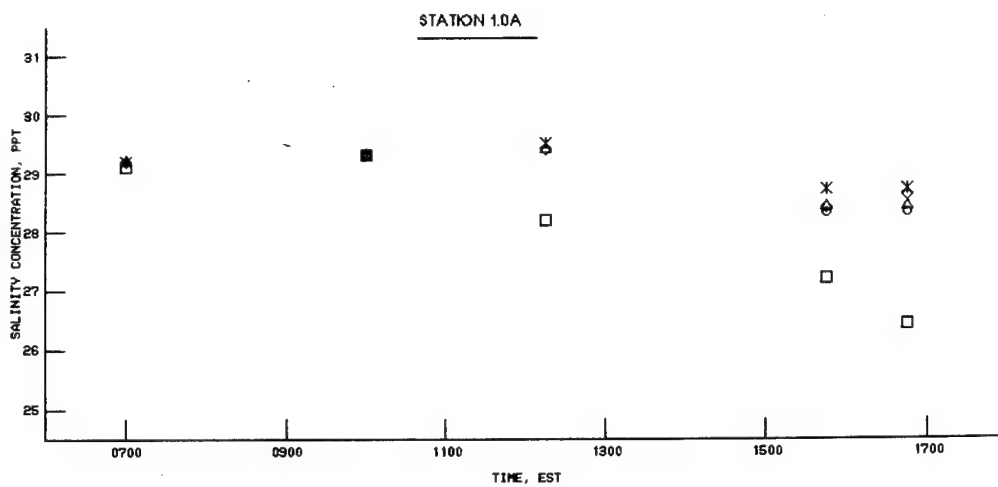
CURRENT SPEED, SALINITY,
AND TEMPERATURE
STATION S4.8, 60% DEPTH
04/18/93 - 05/18/93



CURRENT SPEED, SALINITY,
AND TEMPERATURE
STATION S4.8, 60% DEPTH
05/18/93 - 06/22/93



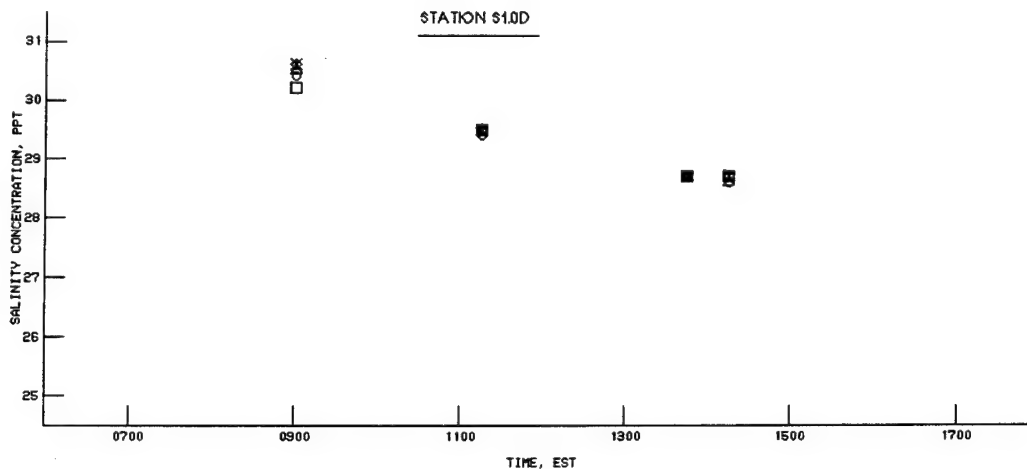
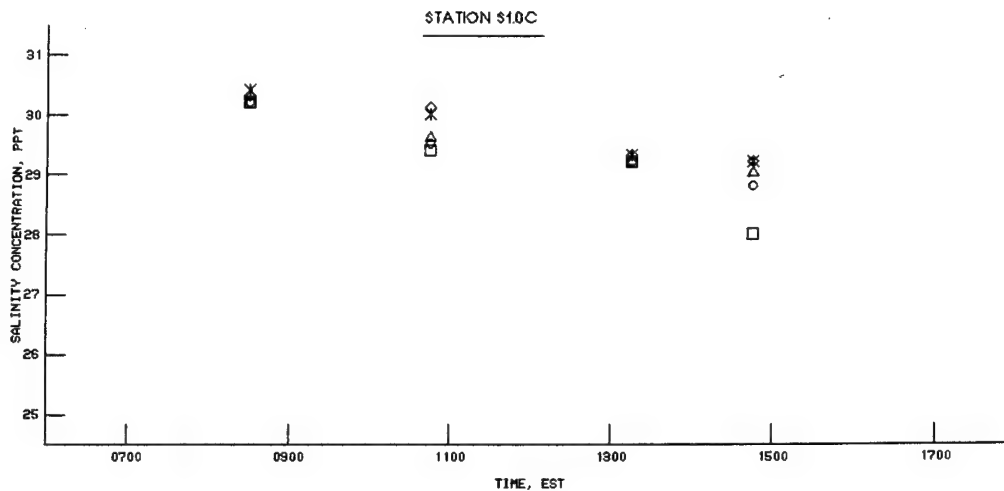
CURRENT SPEED, SALINITY,
AND TEMPERATURE
STATION S4.8, 60% DEPTH
07/13/93 - 08/12/93



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- × - BOTTOM

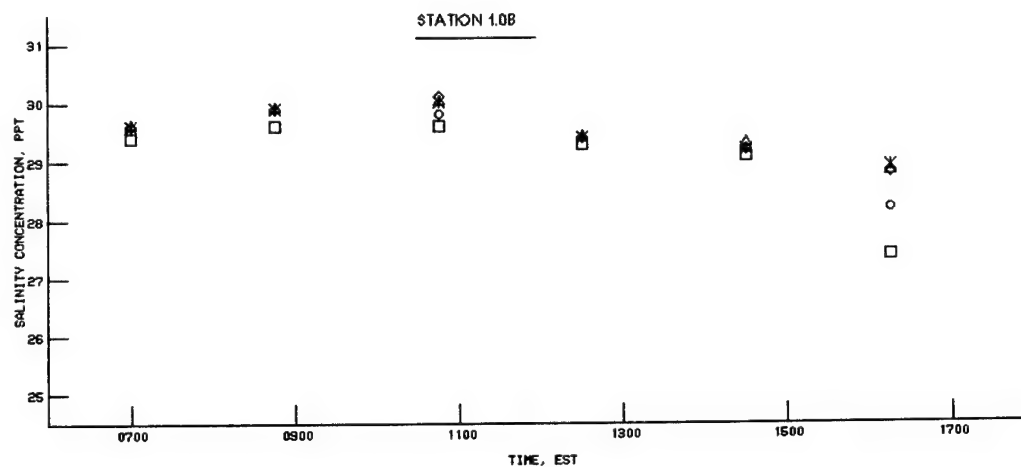
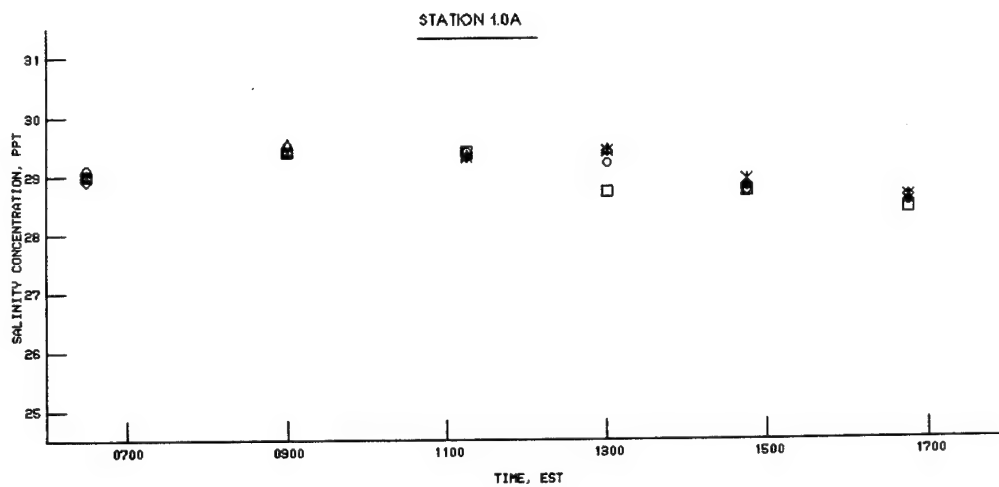
**SALINITY CONCENTRATION
STATIONS S1.0A AND S1.0B
10/11/92**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- * - BOTTOM

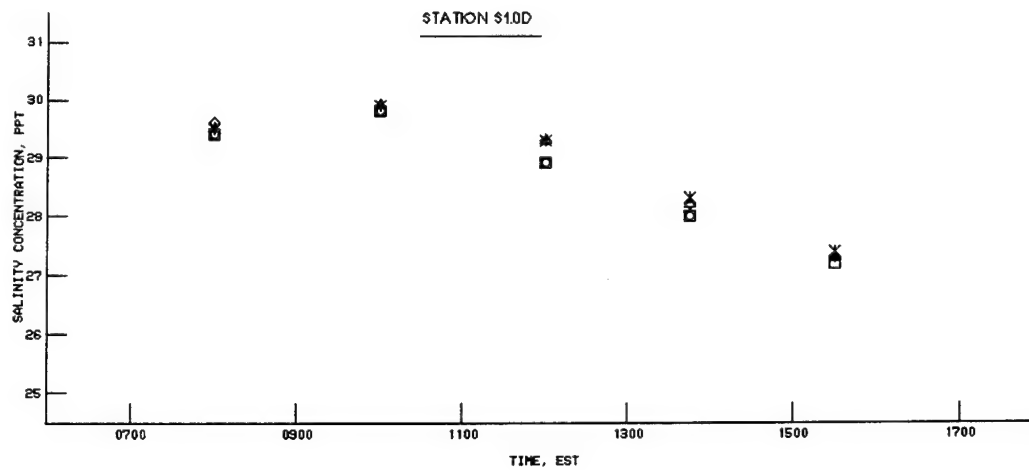
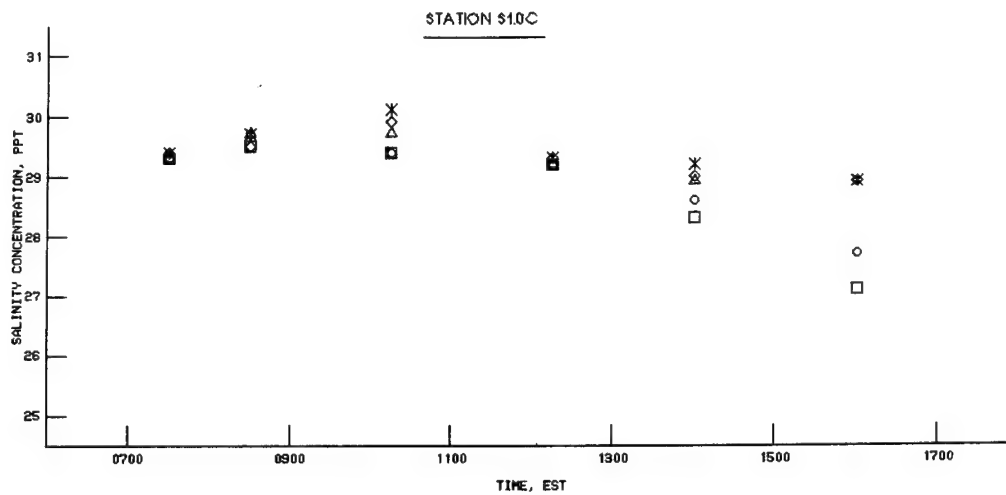
**SALINITY CONCENTRATION
STATIONS S1.0C AND S1.0D
10/11/92**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- ✱ - BOTTOM

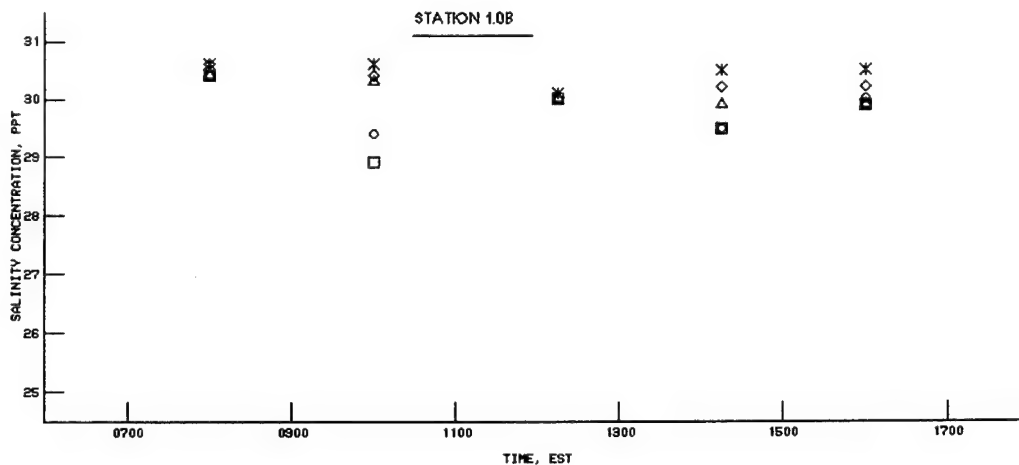
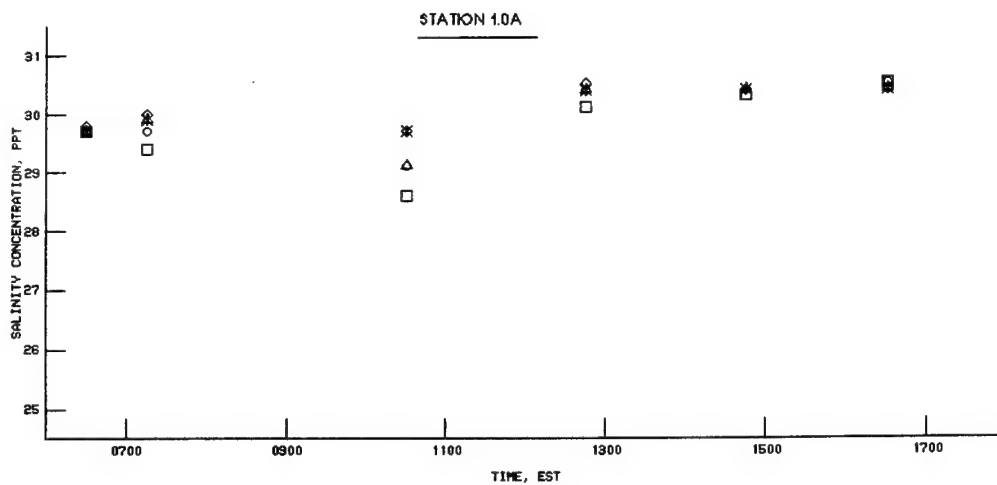
**SALINITY CONCENTRATION
STATIONS S1.0A AND S1.0B
10/13/92**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- ✱ - BOTTOM

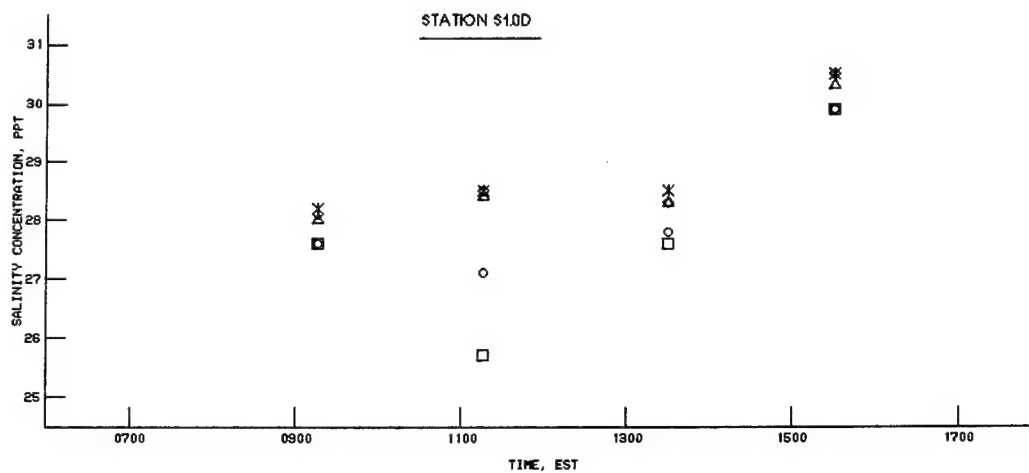
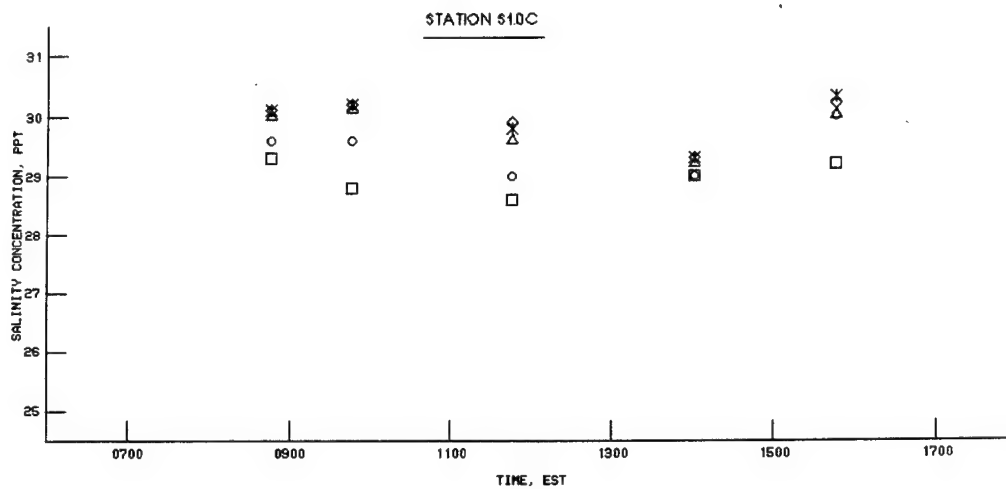
**SALINITY CONCENTRATION
STATIONS S1.0C AND S1.0D
10/13/92**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- × - BOTTOM

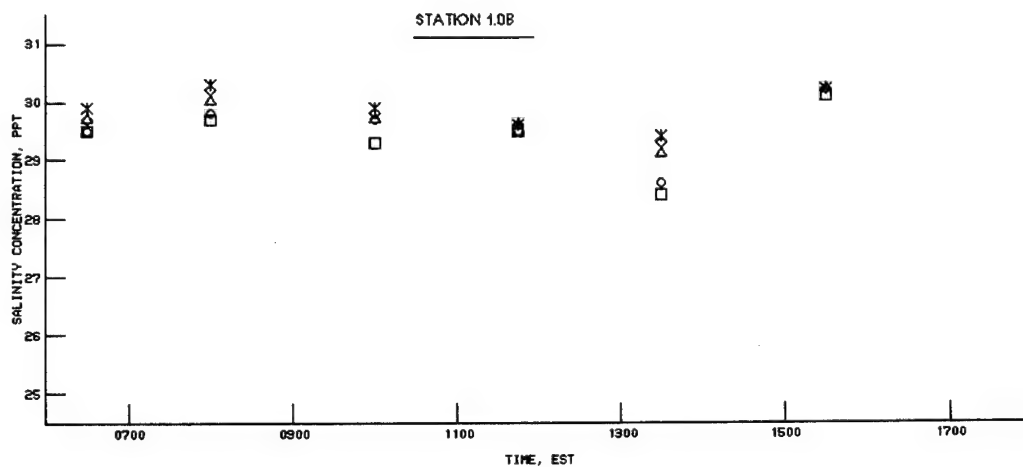
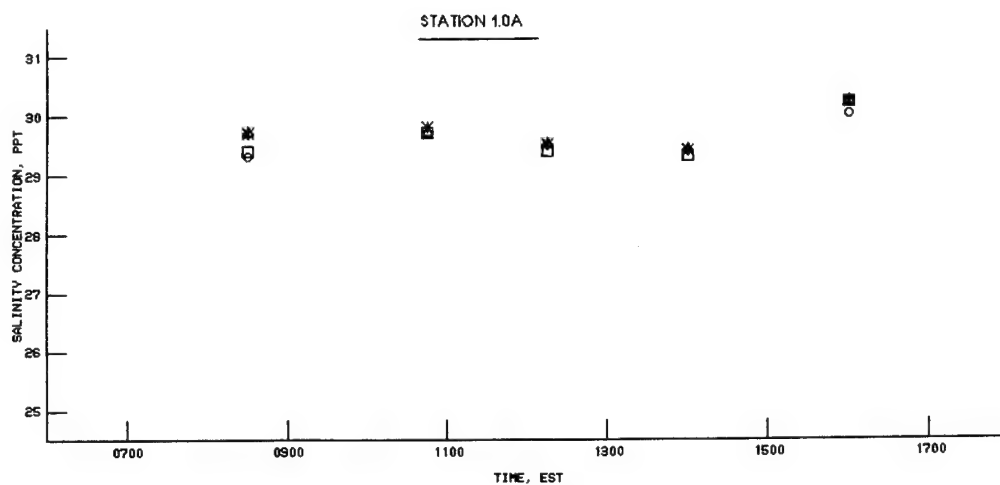
**SALINITY CONCENTRATION
STATIONS S1.0A AND S1.0B
10/20/92**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- × - BOTTOM

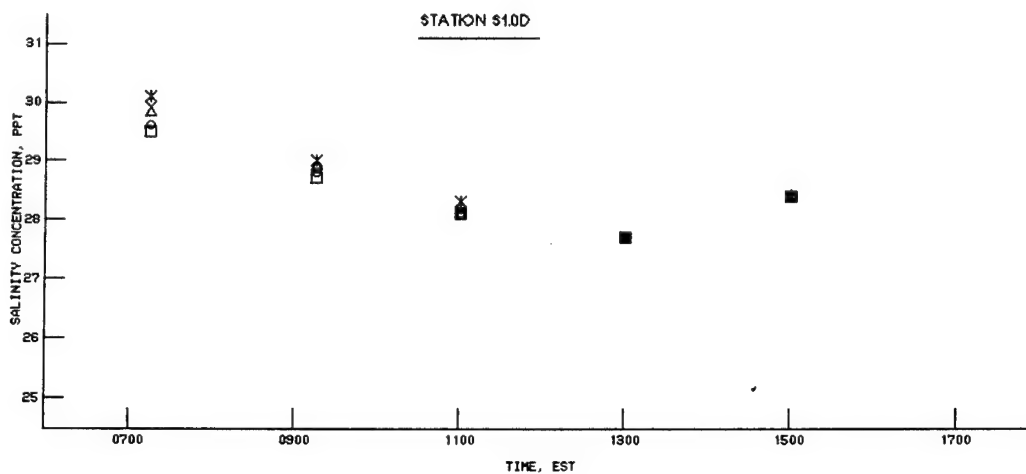
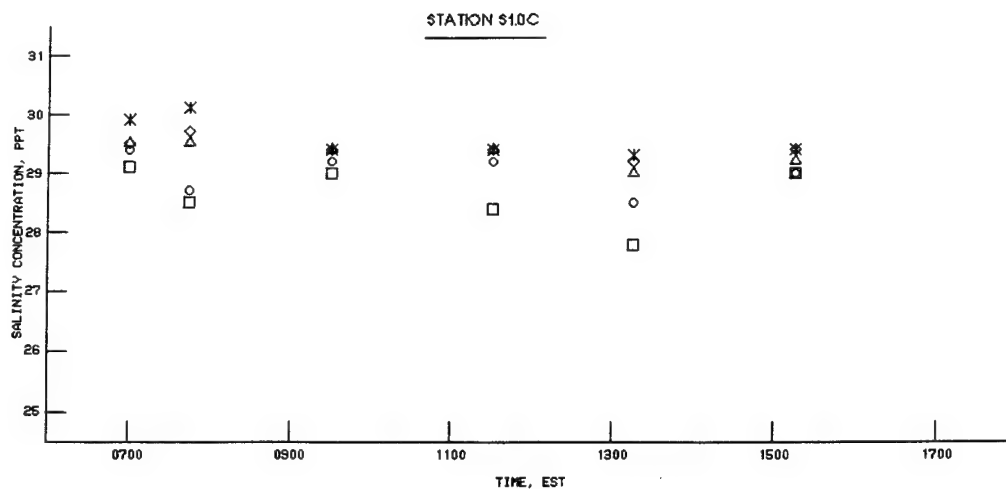
**SALINITY CONCENTRATION
STATIONS S1.0C AND S1.0D
10/20/92**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- ✕ - BOTTOM

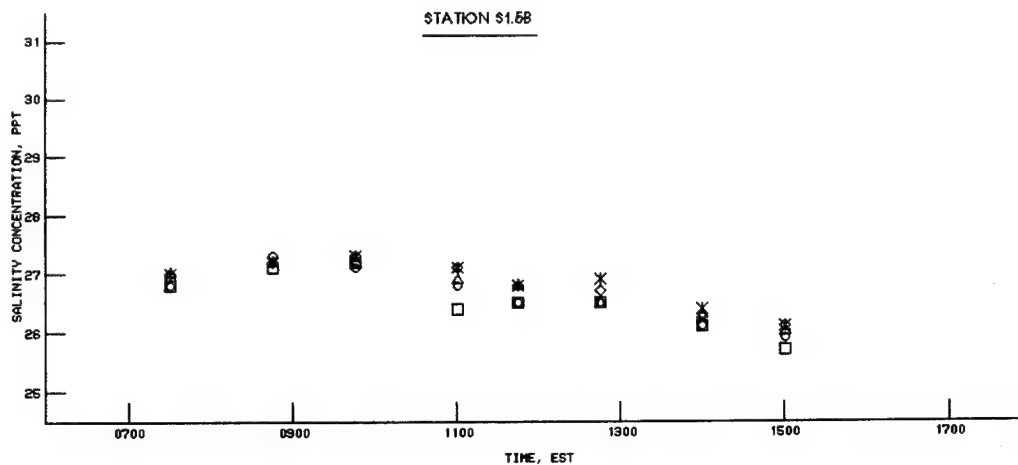
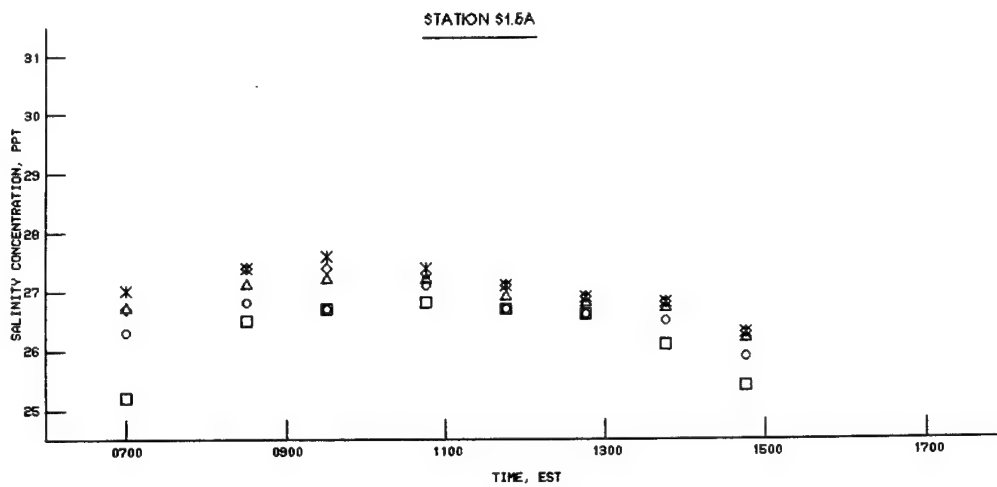
**SALINITY CONCENTRATION
STATIONS S1.0A AND S1.0B
10/23/92**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- × - BOTTOM

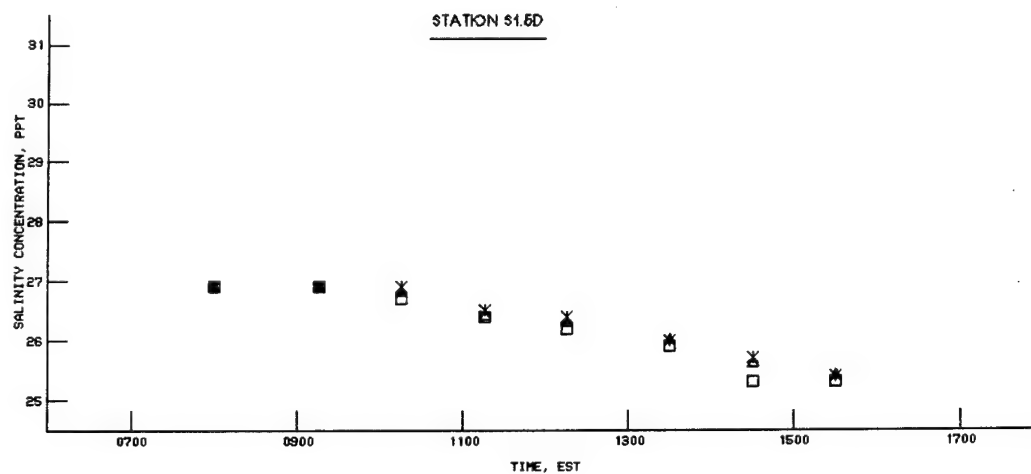
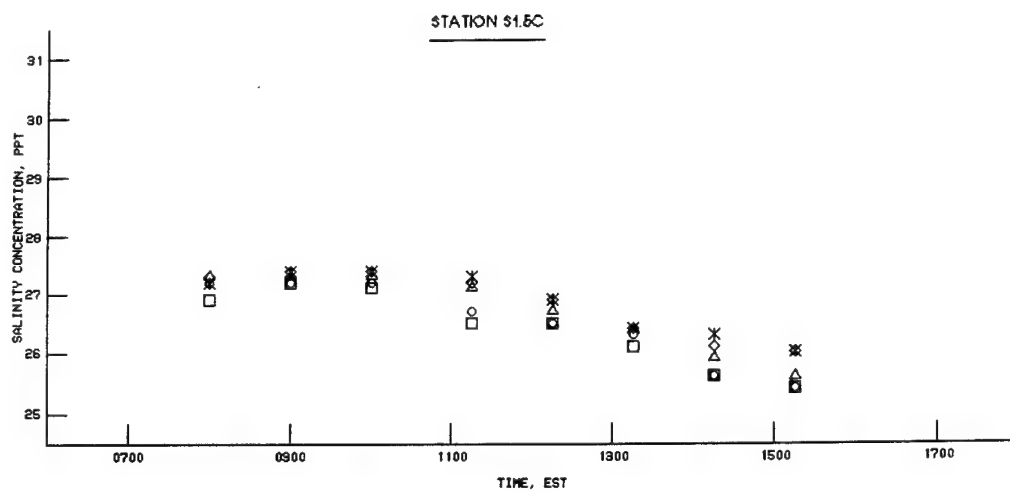
**SALINITY CONCENTRATION
STATIONS S1.0C AND S1.0D
10/23/92**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- ✱ - BOTTOM

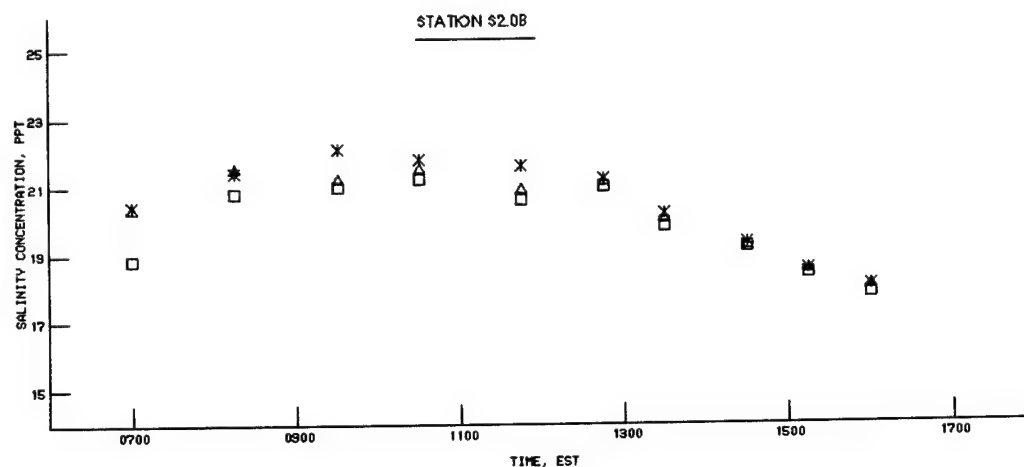
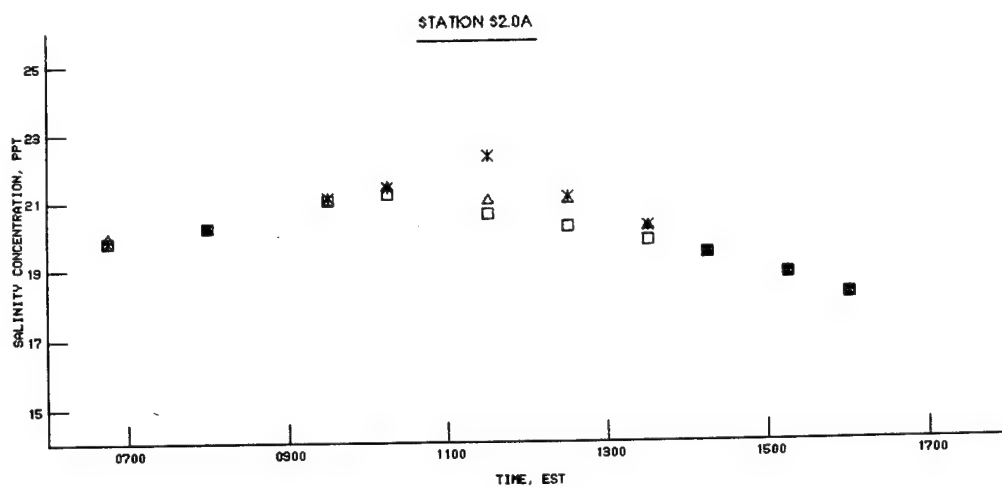
**SALINITY CONCENTRATION
STATIONS S1.5A AND S1.5B
10/11/92**



LEGEND

| | |
|---|-----------------------|
| □ | - SURFACE |
| ○ | - ONE-QUARTER DEPTH |
| △ | - MIDDEPTH |
| ◇ | - THREE-QUARTER DEPTH |
| * | - BOTTOM |

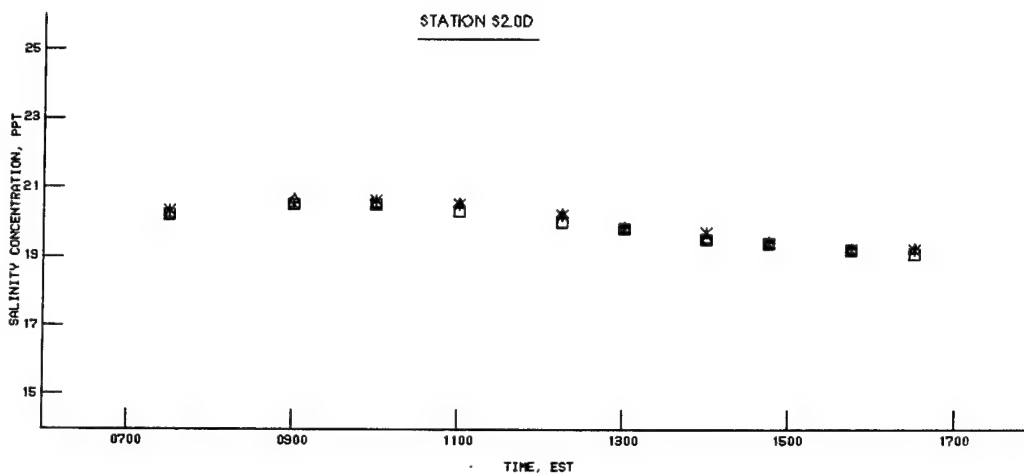
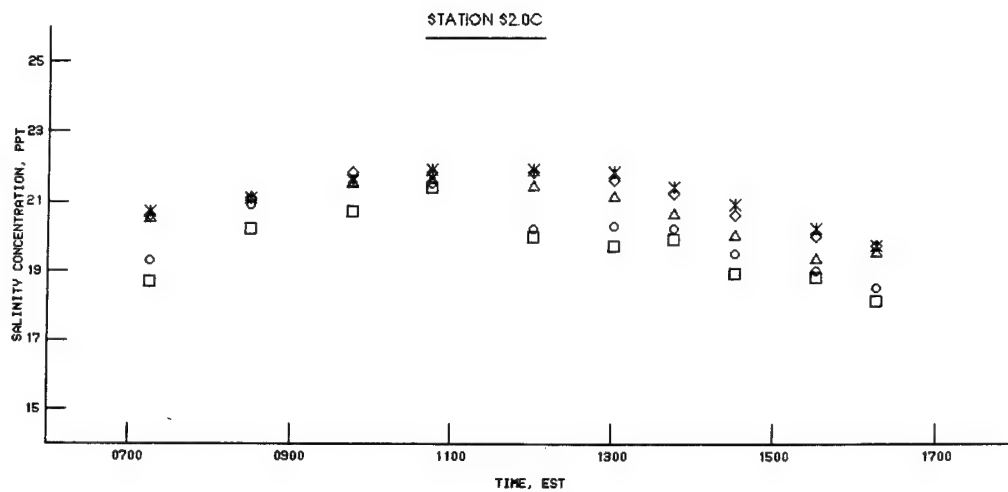
**SALINITY CONCENTRATION
STATIONS S1.5C AND S1.5D
10/11/92**



LEGEND

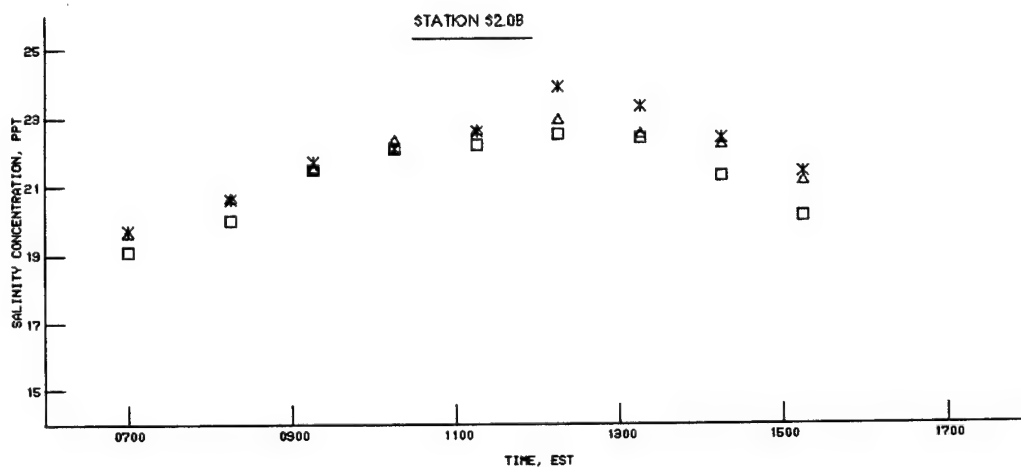
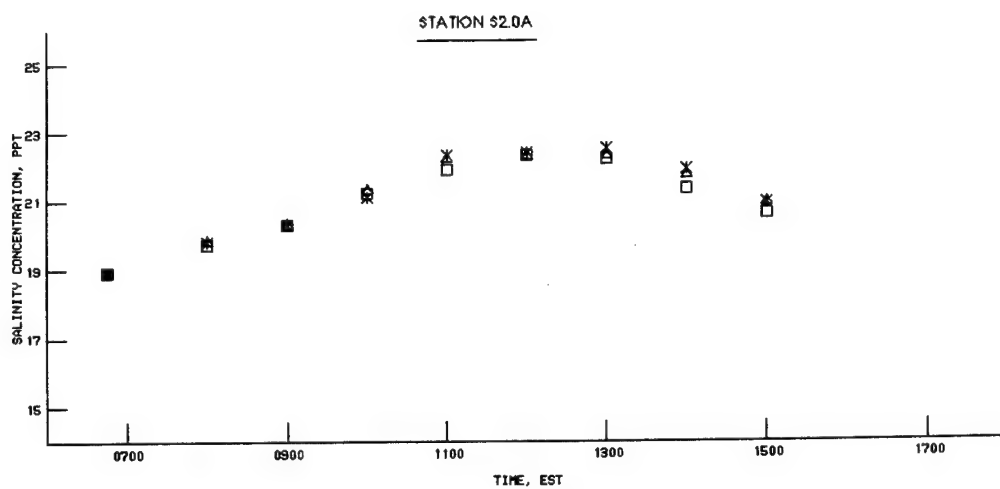
- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- × - BOTTOM

**SALINITY CONCENTRATION
STATIONS S2.0A AND S2.0B
10/11/92**



- LEGEND**
- - SURFACE
 - - ONE-QUARTER DEPTH
 - △ - MIDDEPTH
 - ◇ - THREE-QUARTER DEPTH
 - ✕ - BOTTOM

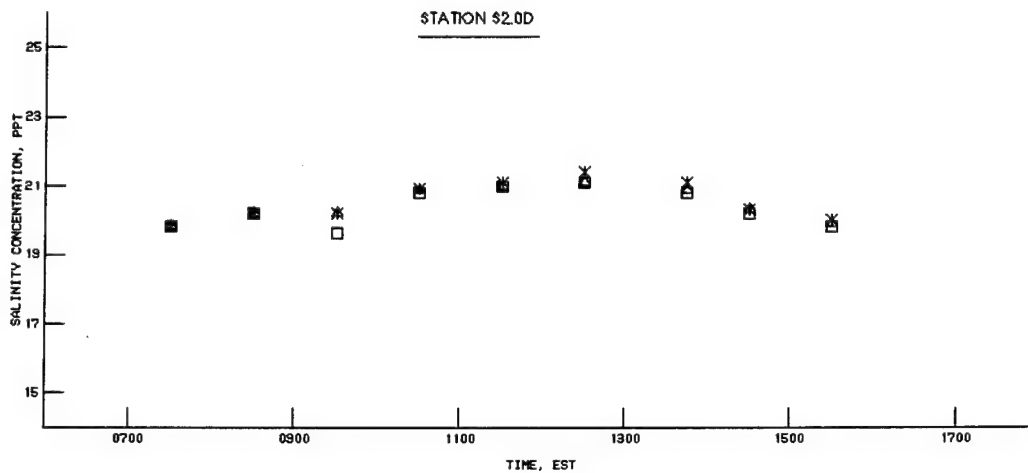
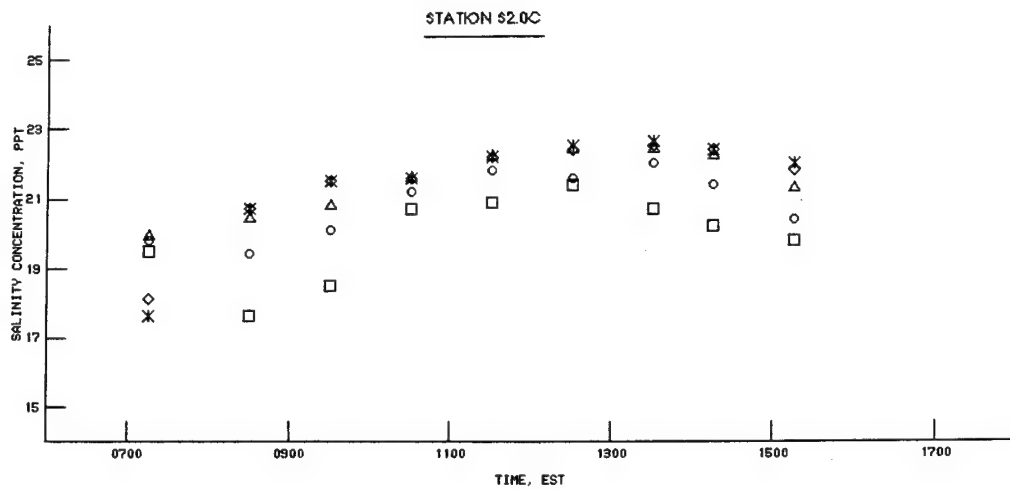
**SALINITY CONCENTRATION
STATIONS S2.0C AND S2.0D
10/11/92**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- ✱ - BOTTOM

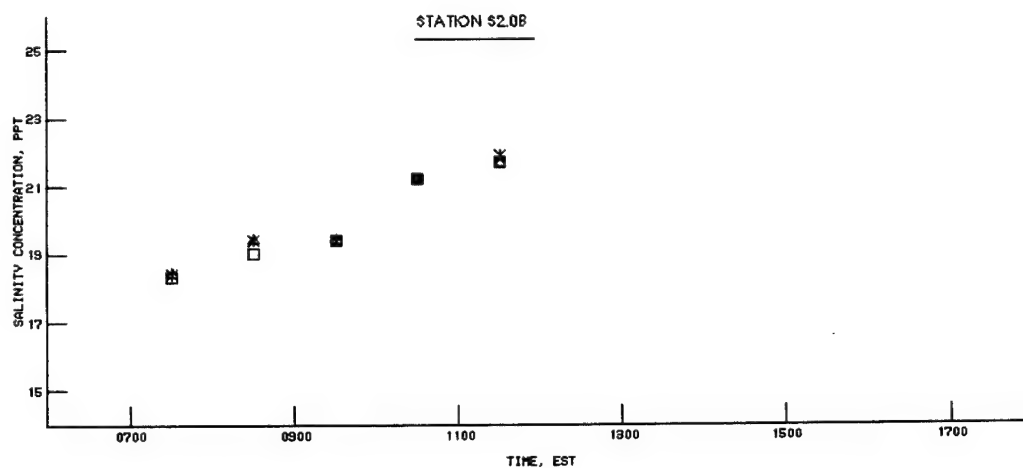
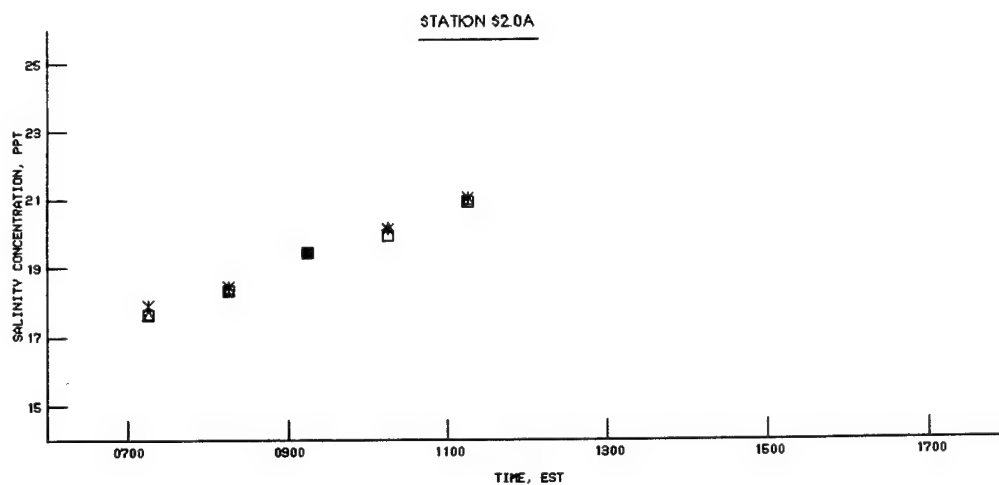
**SALINITY CONCENTRATION
STATIONS S2.0A AND S2.0B
10/14/92**



LEGEND

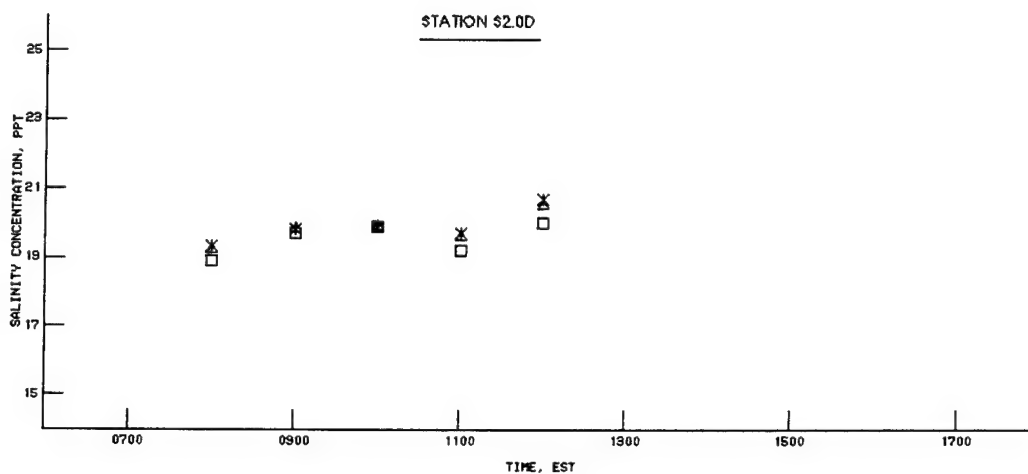
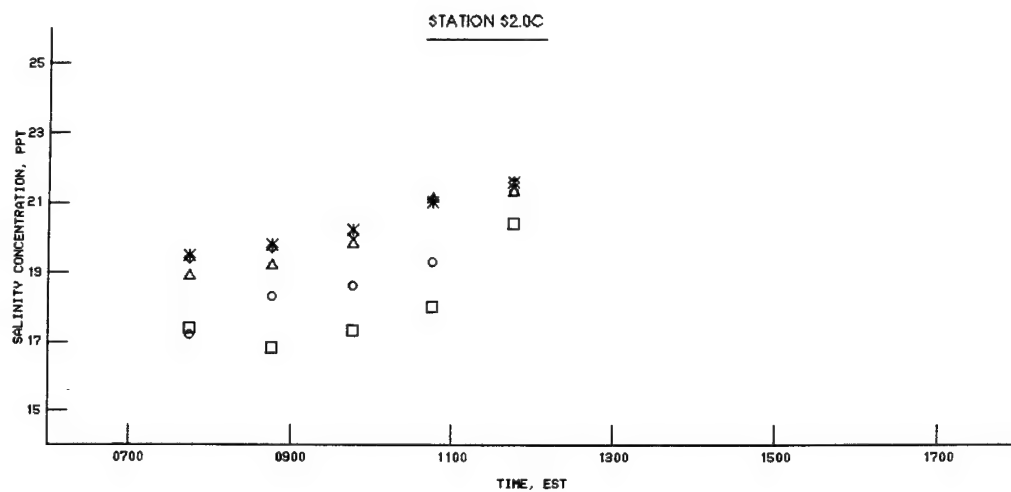
- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- ✕ - BOTTOM

**SALINITY CONCENTRATION
STATIONS S2.0C AND S2.0D
10/14/92**



- LEGEND**
- - SURFACE
 - - ONE-QUARTER DEPTH
 - △ - MIDDEPTH
 - ◇ - THREE-QUARTER DEPTH
 - * - BOTTOM

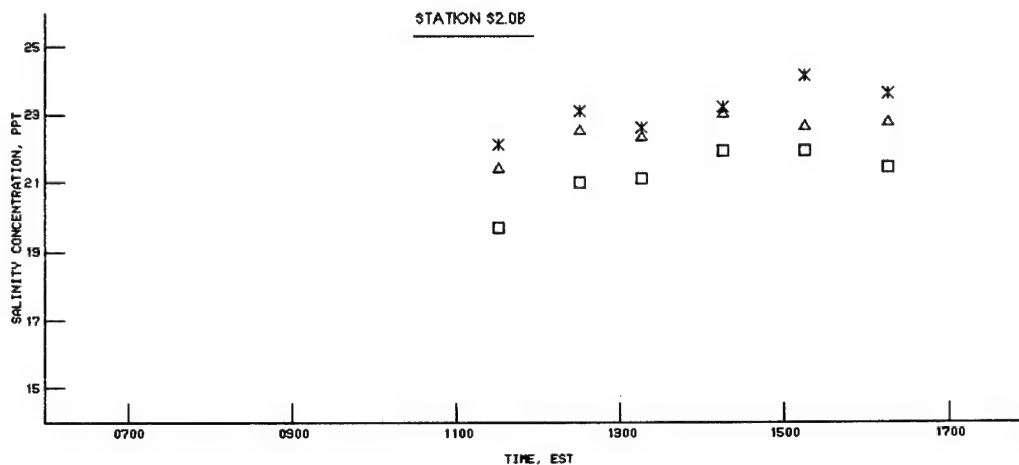
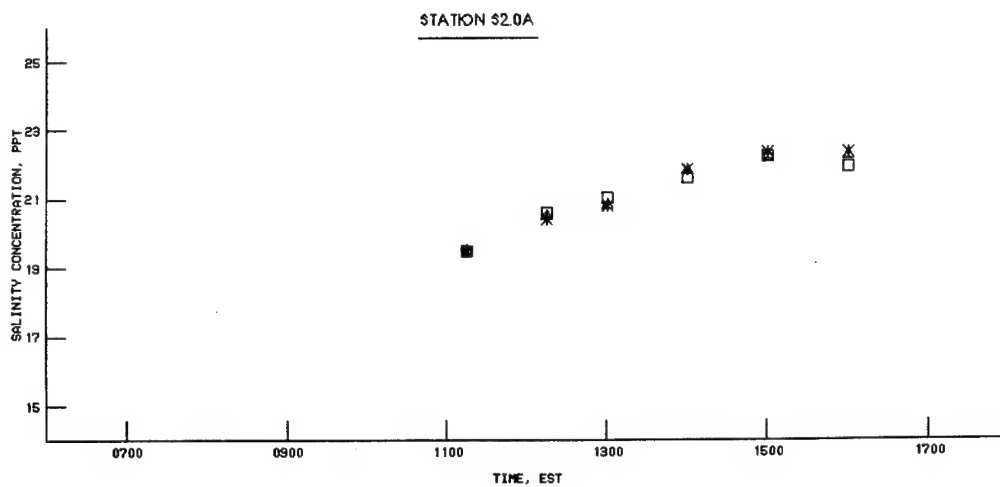
**SALINITY CONCENTRATION
STATIONS S2.0A AND S2.0B
10/16/92**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- X - BOTTOM

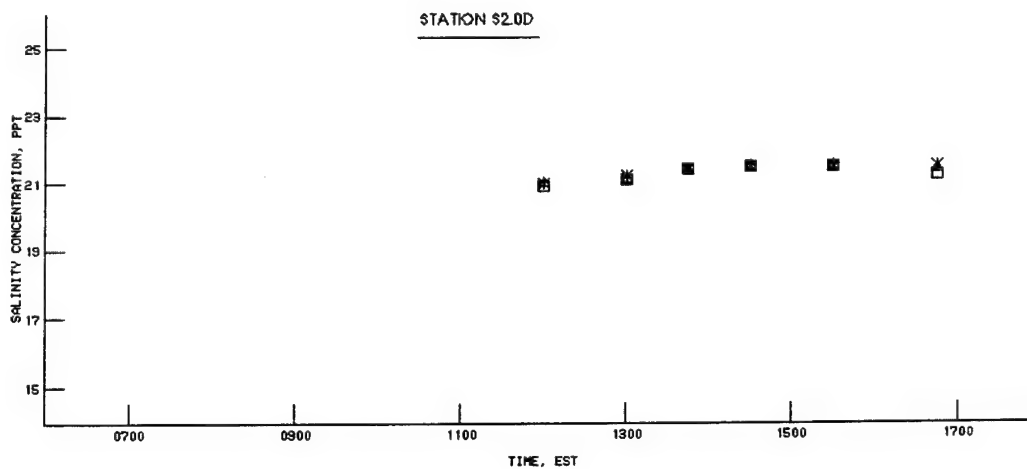
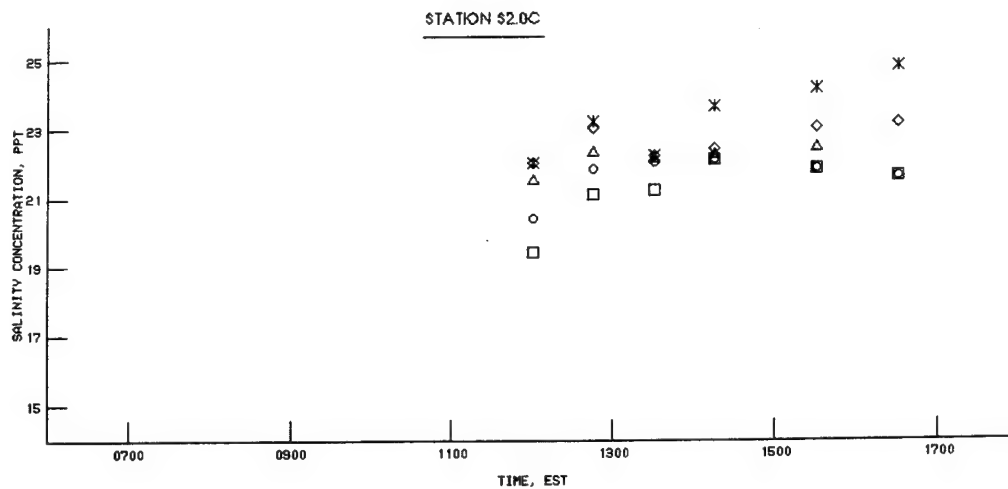
**SALINITY CONCENTRATION
STATIONS S2.0C AND S2.0D
10/16/92**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- ✱ - BOTTOM

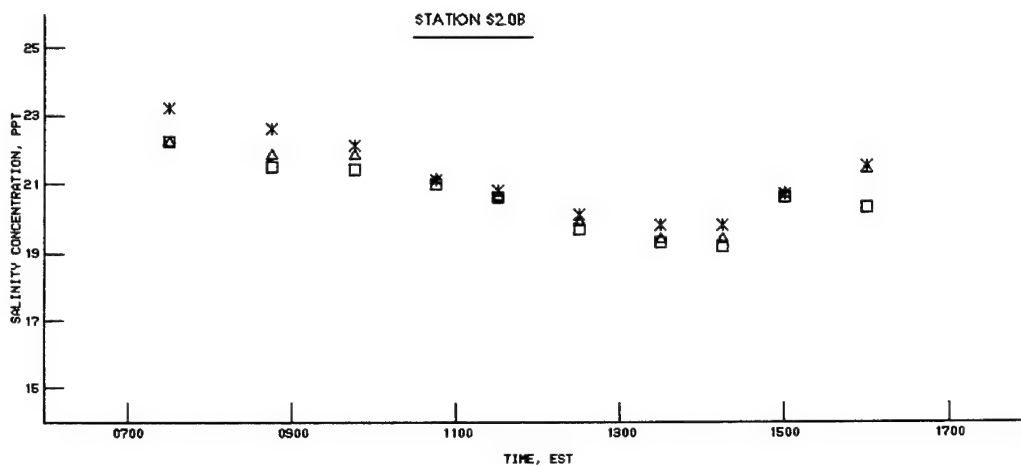
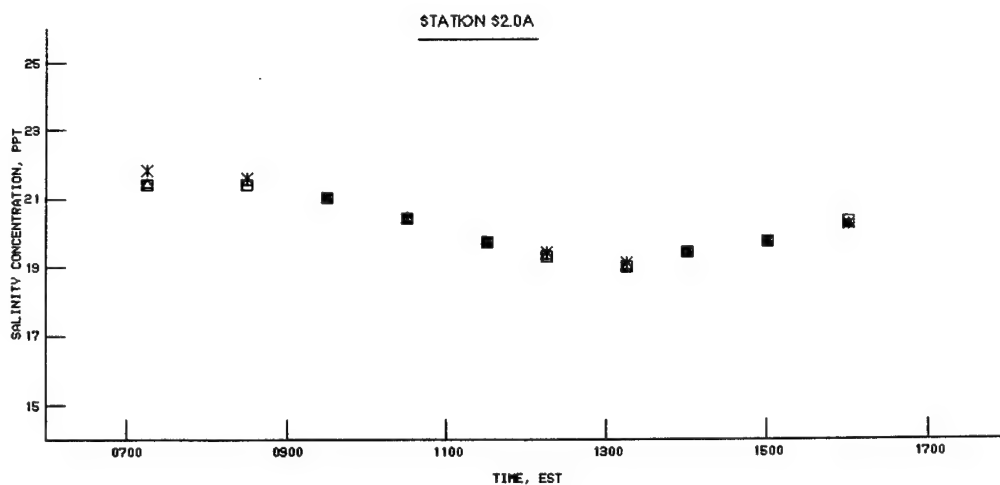
**SALINITY CONCENTRATION
STATIONS S2.0A AND S2.0B
10/18/92**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- * - BOTTOM

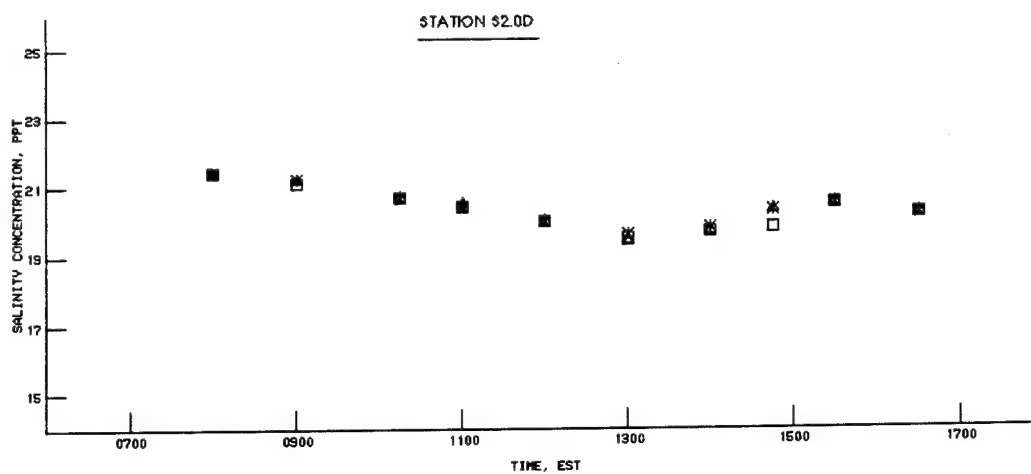
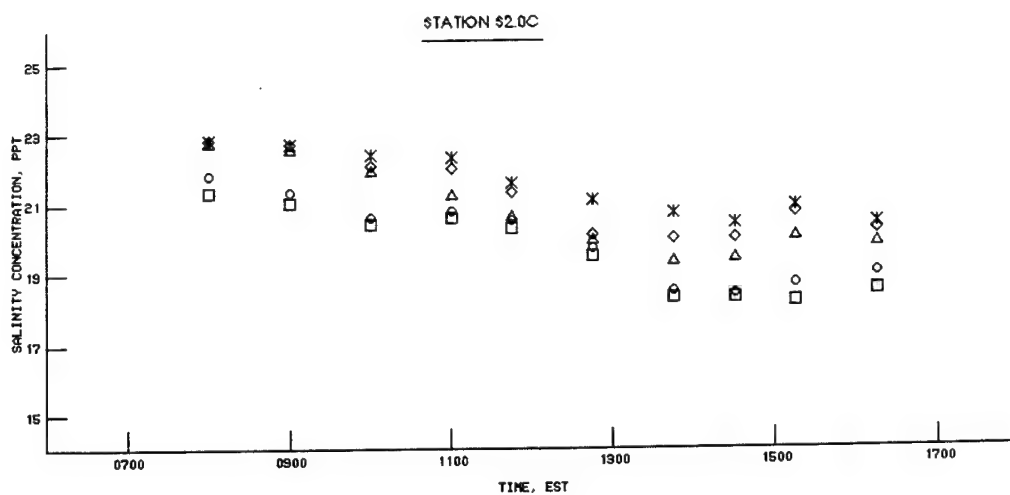
**SALINITY CONCENTRATION
STATIONS S2.0C AND S2.0D
10/18/92**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- * - BOTTOM

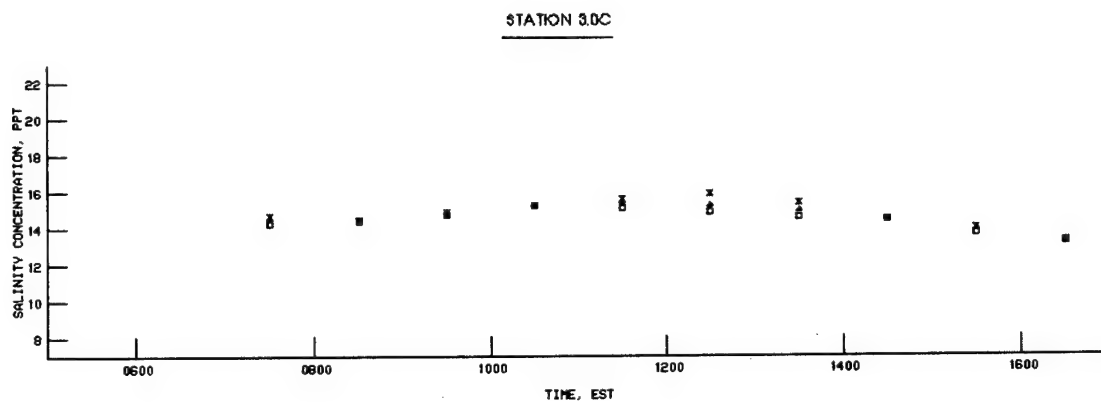
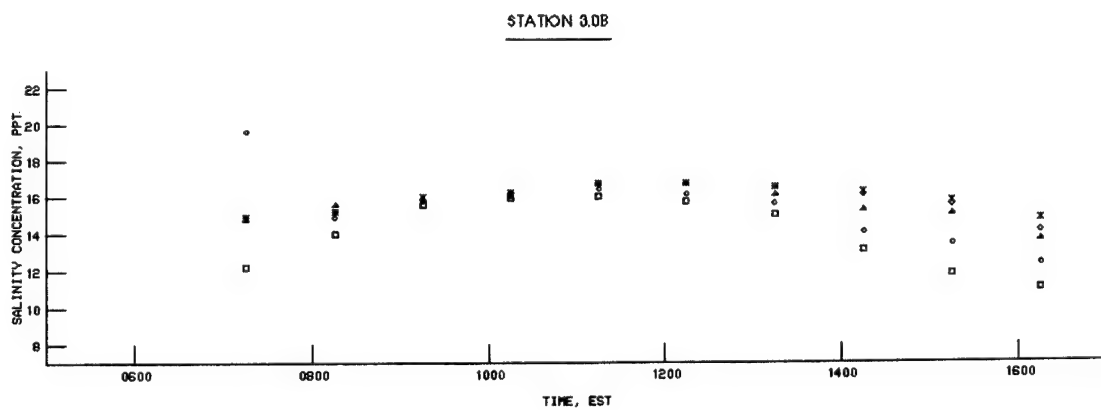
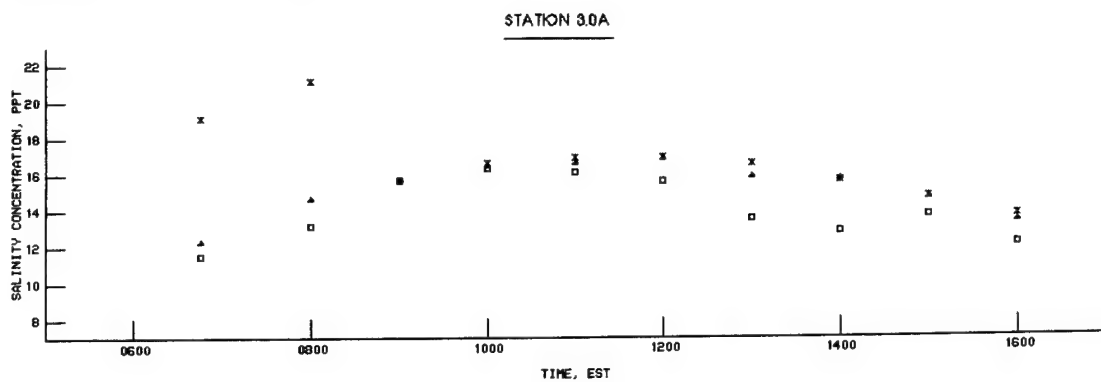
**SALINITY CONCENTRATION
STATIONS S2.0A AND S2.0B
10/22/92**



LEGEND

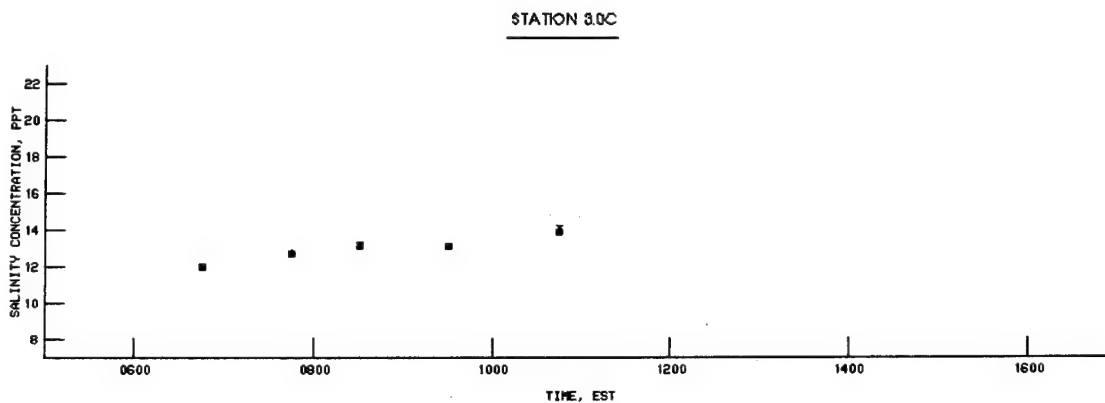
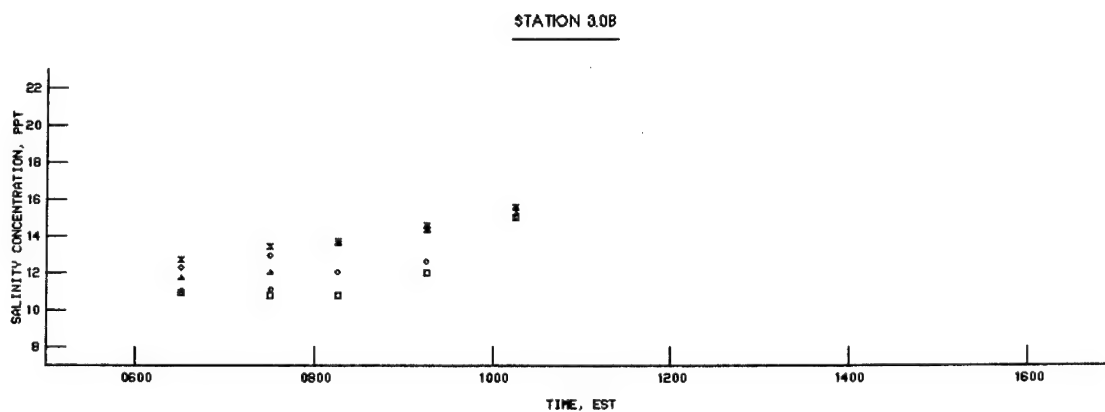
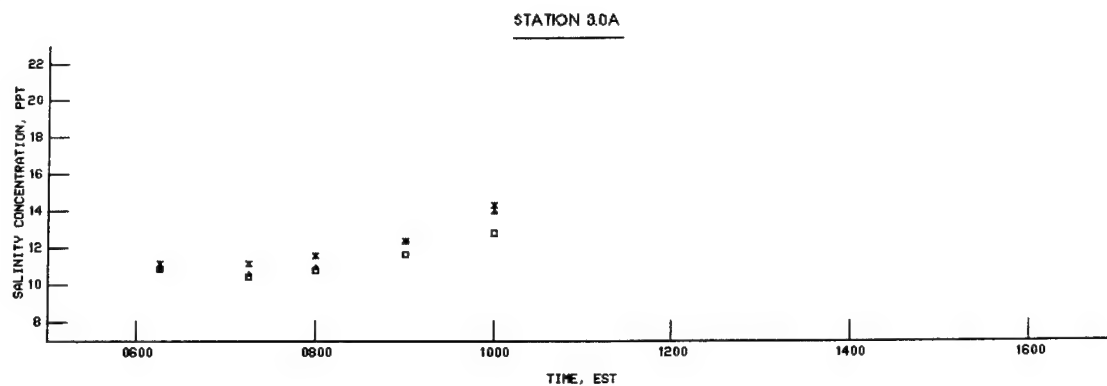
- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- ✱ - BOTTOM

**SALINITY CONCENTRATION
STATIONS S2.0C AND S2.0D
10/22/92**



- LEGEND
- - SURFACE
 - - ONE-QUARTER DEPTH
 - △ - MIDDEPTH
 - ◇ - THREE-QUARTER DEPTH
 - X - BOTTOM

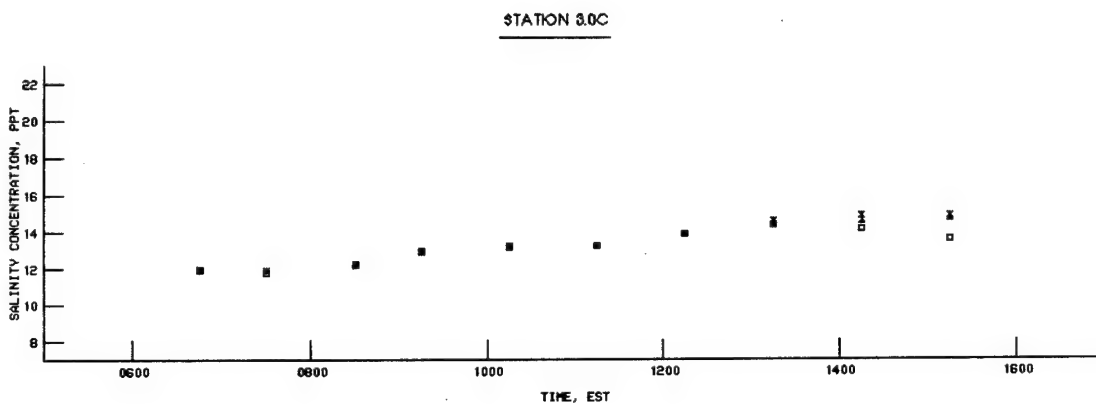
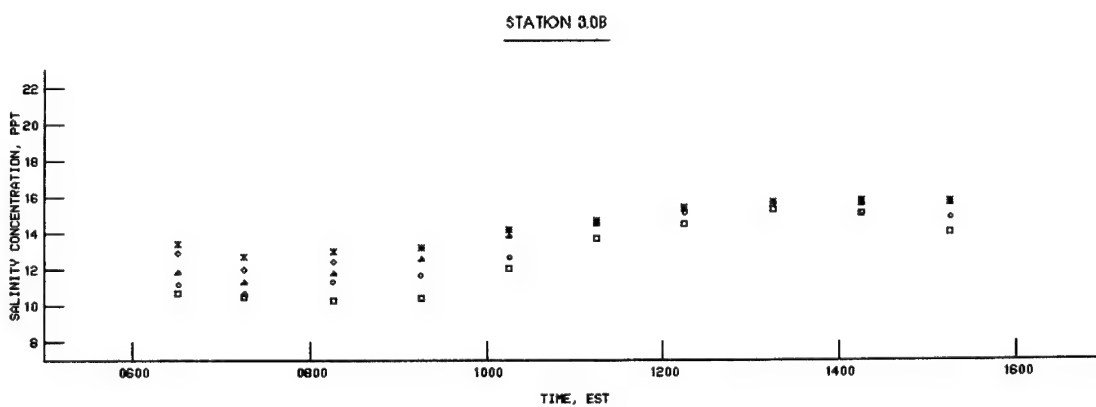
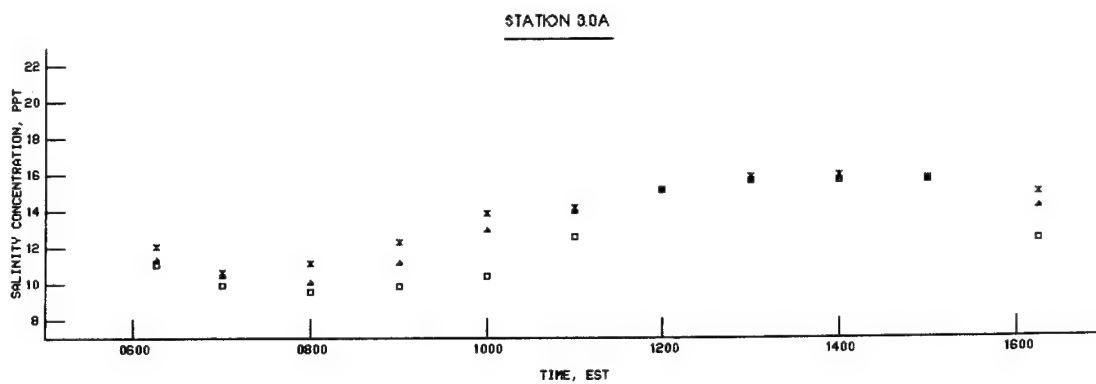
**SALINITY CONCENTRATION
STATIONS S3.0A, S3.0B, AND S3.0C
10/11/92**



LEGEND

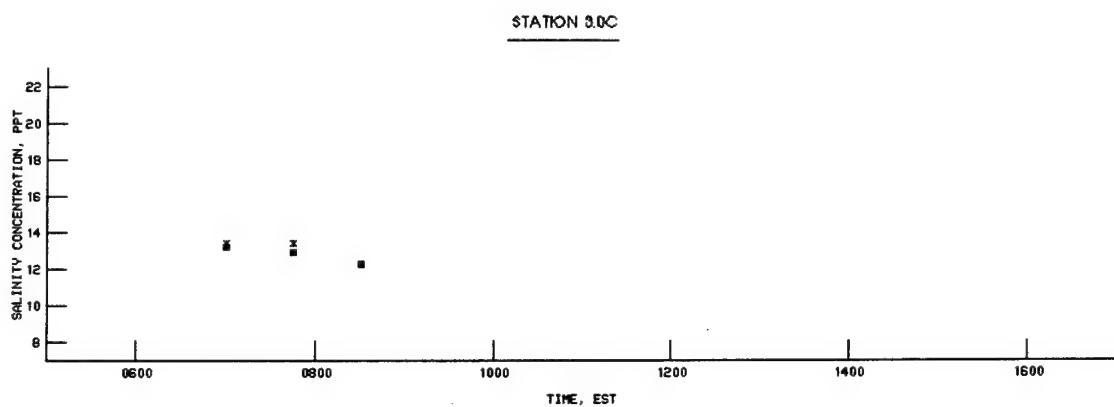
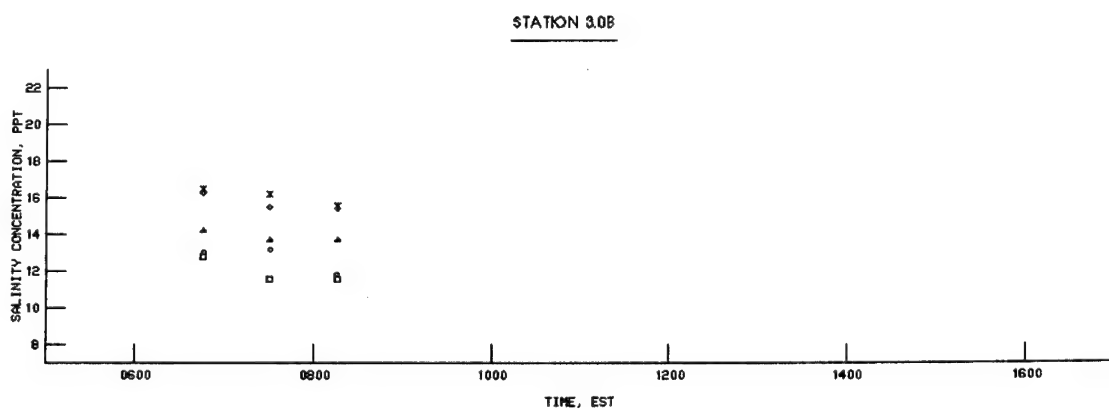
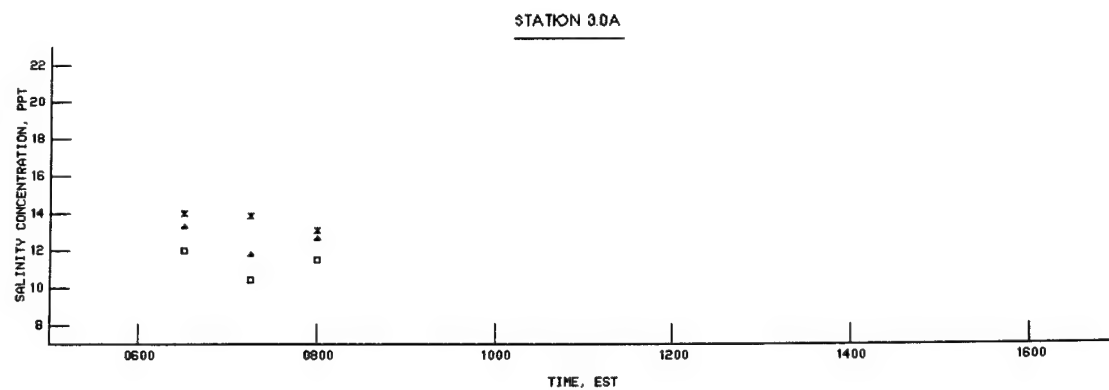
- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- × - BOTTOM

**SALINITY CONCENTRATION
STATIONS S3.0A, S3.0B, AND S3.0C
10/13/92**



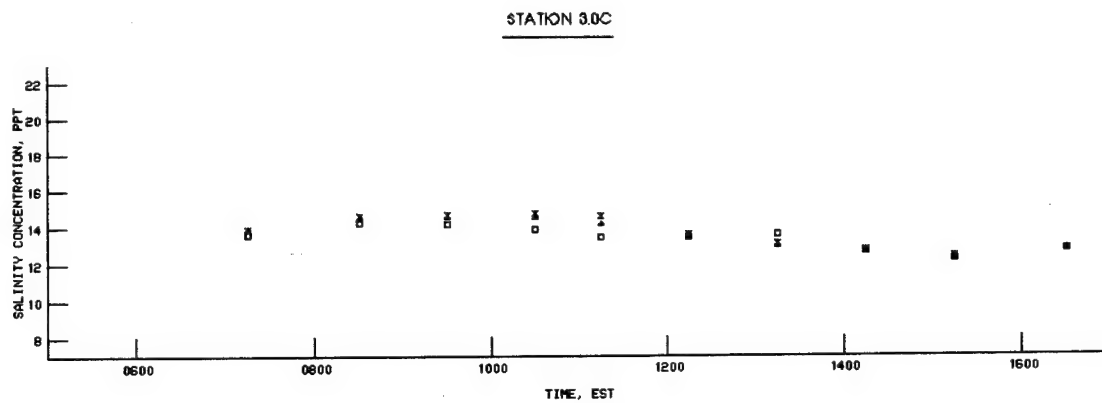
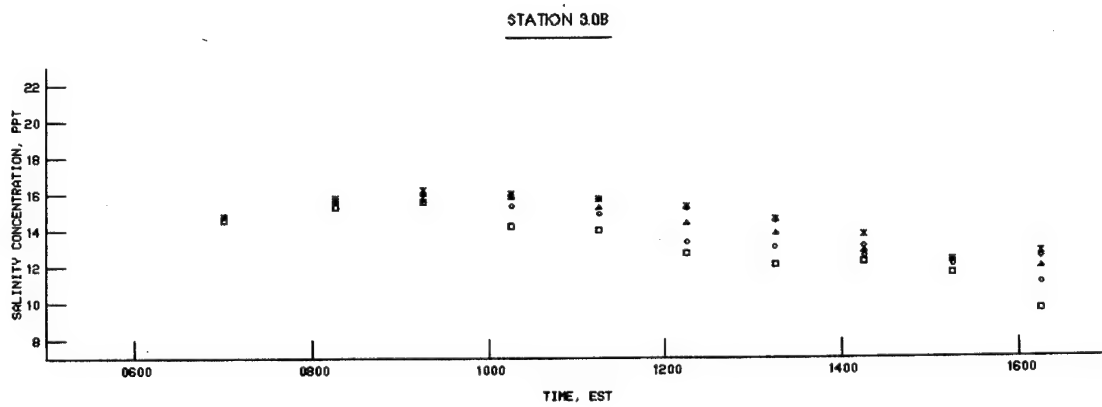
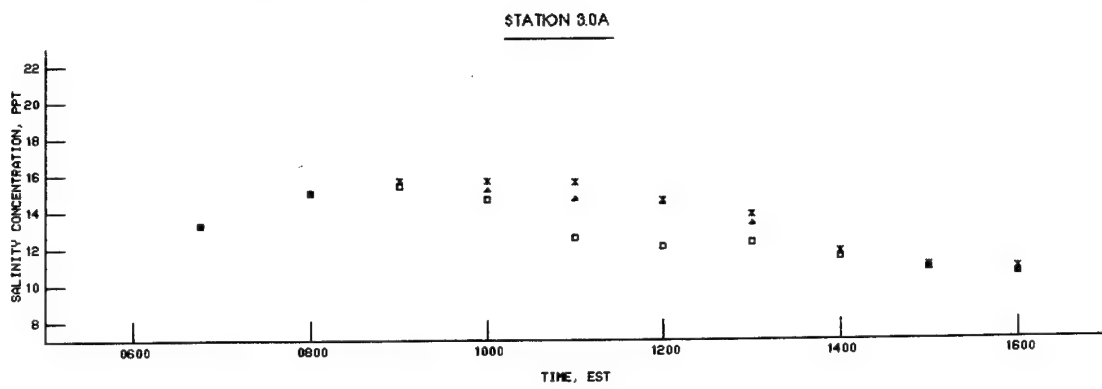
- LEGEND**
- - SURFACE
 - - ONE-QUARTER DEPTH
 - △ - MIDDEPTH
 - ◇ - THREE-QUARTER DEPTH
 - X - BOTTOM

**SALINITY CONCENTRATION
STATIONS S3.0A, S3.0B, AND S3.0C
10/15/92**



- LEGEND
- - SURFACE
 - - ONE-QUARTER DEPTH
 - △ - MIDDEPTH
 - ◇ - THREE-QUARTER DEPTH
 - × - BOTTOM

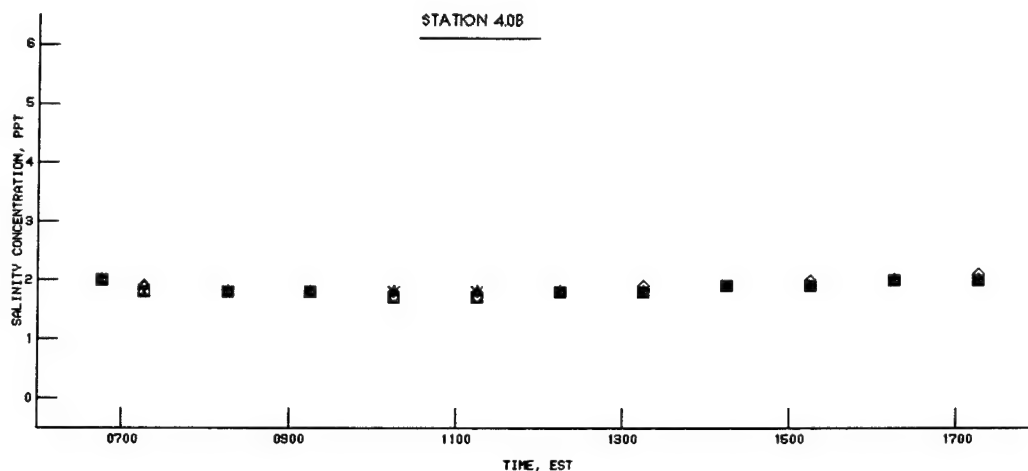
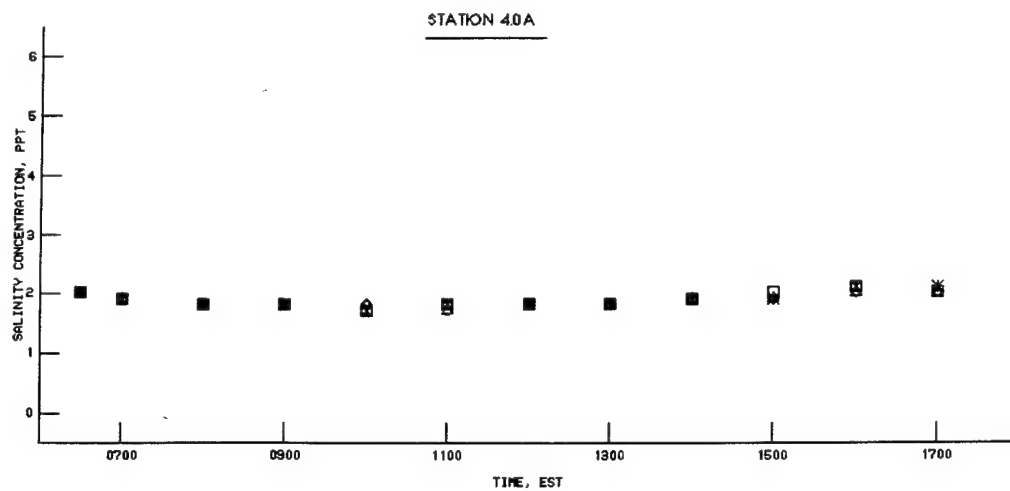
**SALINITY CONCENTRATION
STATIONS S3.0A, S3.0B, AND S3.0C
10/19/92**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- ✱ - BOTTOM

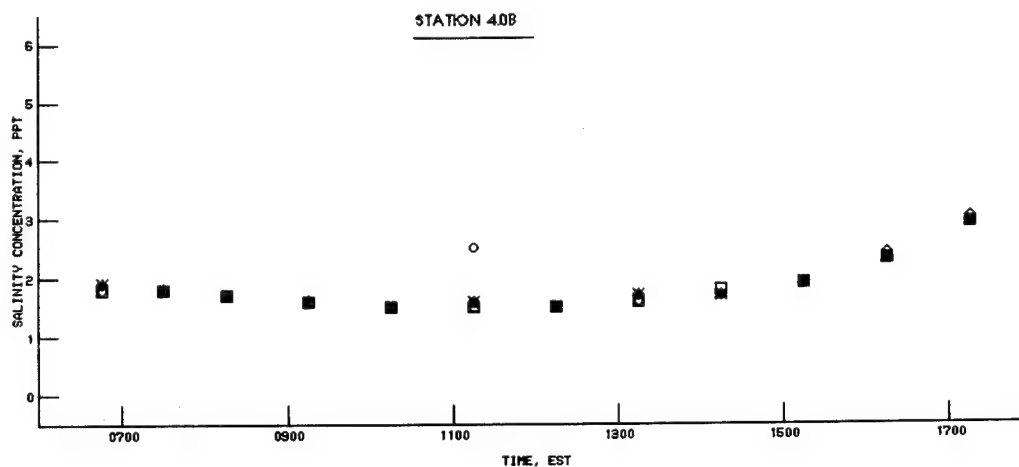
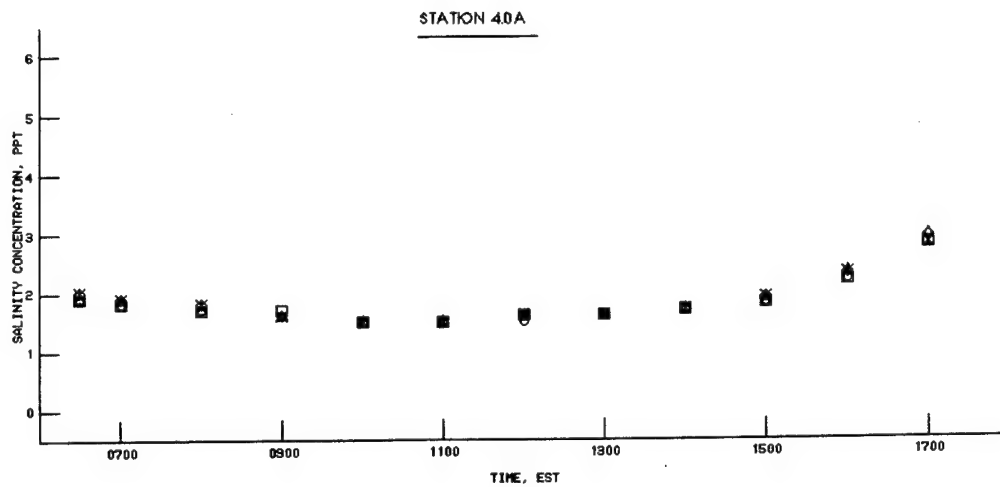
**SALINITY CONCENTRATION
STATIONS S3.0A, S3.0B, AND S3.0C
10/23/92**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- ✕ - BOTTOM

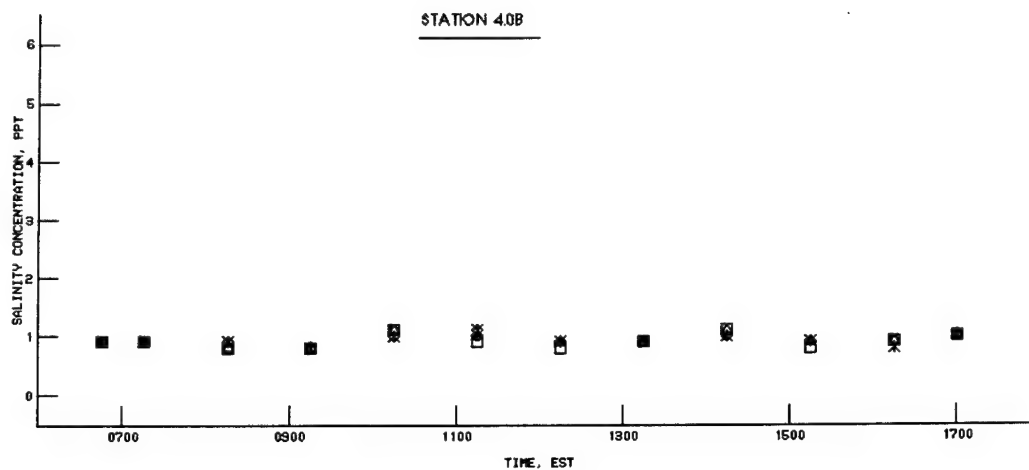
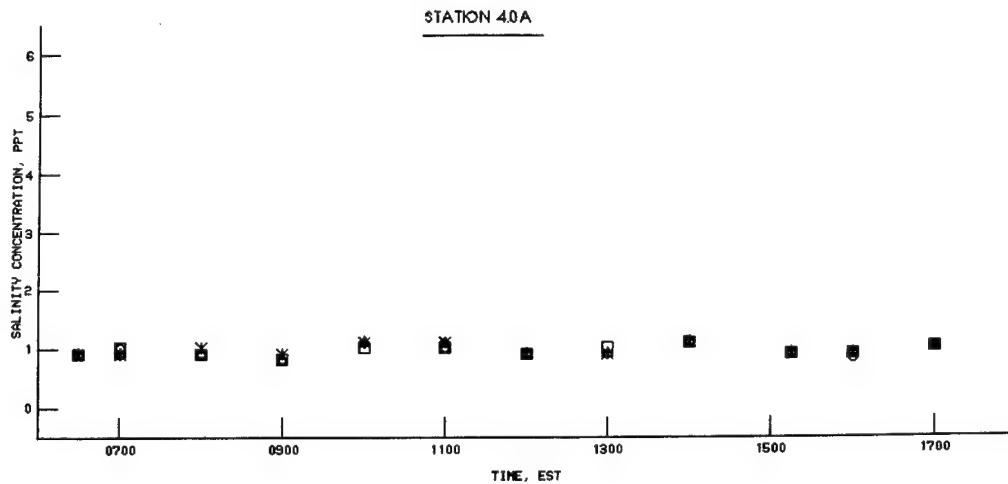
**SALINITY CONCENTRATION
STATIONS S4.0A AND S4.0B
10/13/92**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- * - BOTTOM

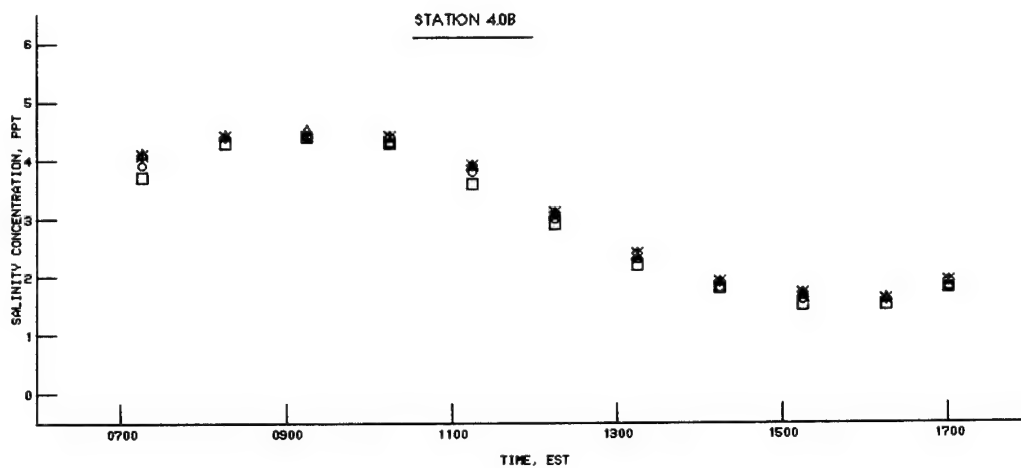
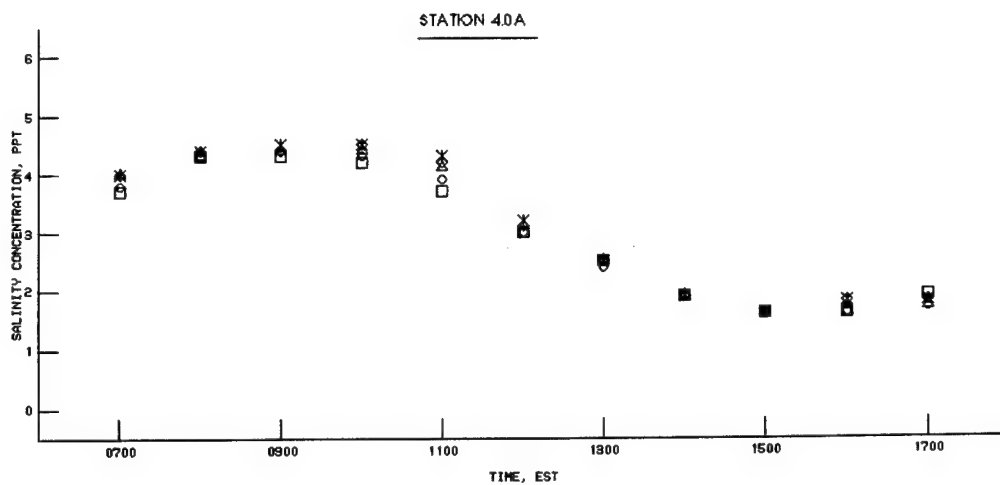
**SALINITY CONCENTRATION
STATIONS S4.0A AND S4.0B
10/15/92**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- ✱ - BOTTOM

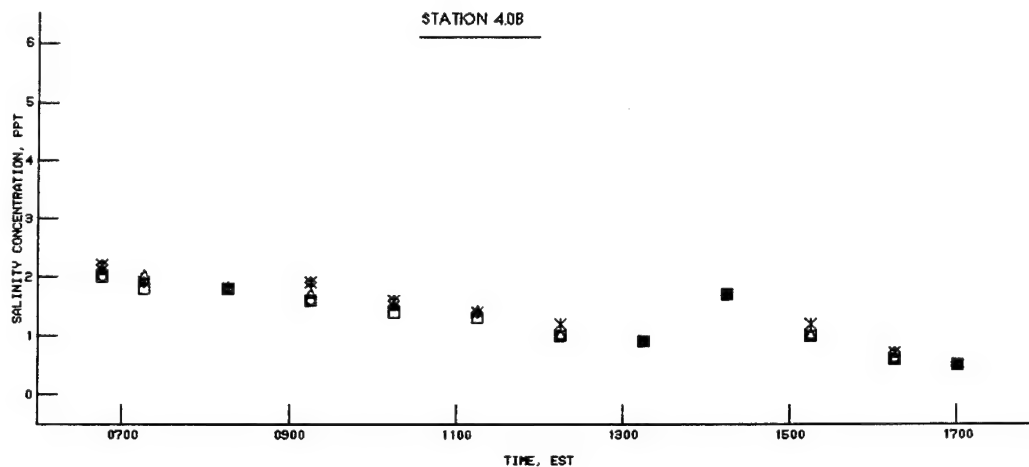
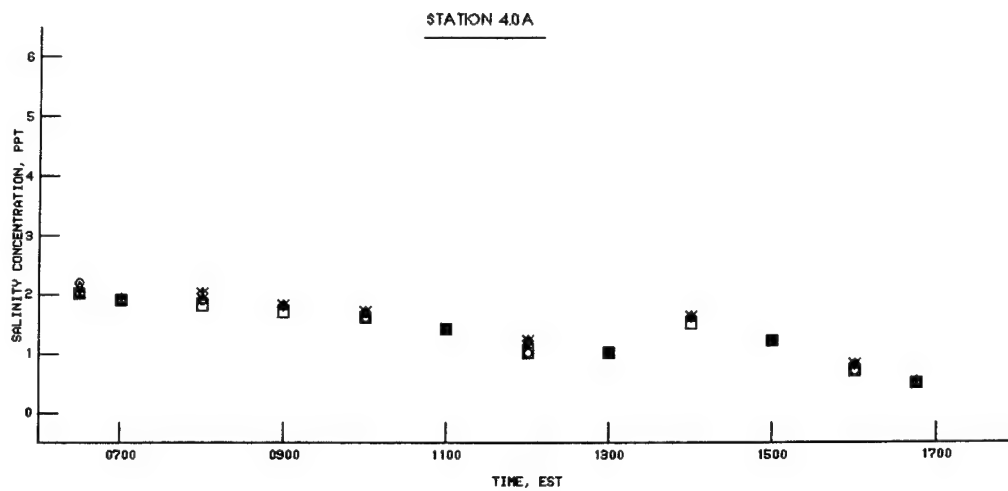
**SALINITY CONCENTRATION
STATIONS S4.0A AND S4.0B
10/17/92**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- X - BOTTOM

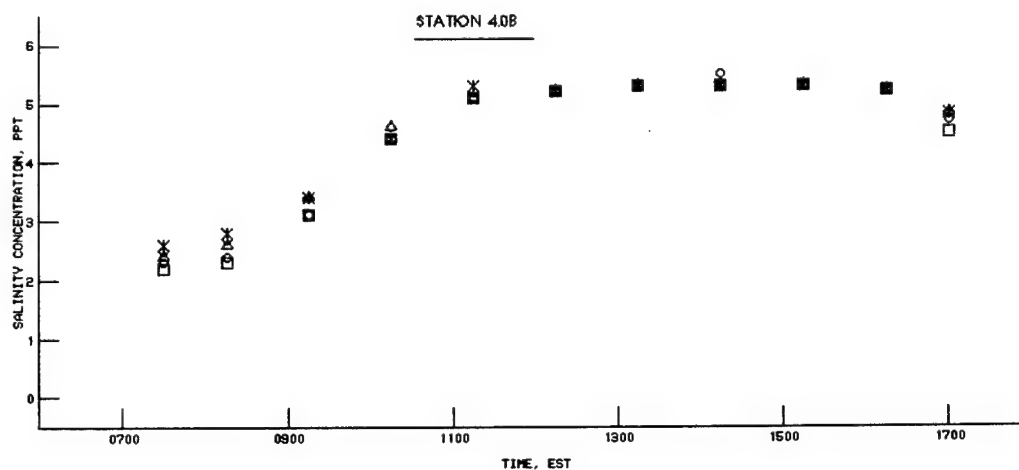
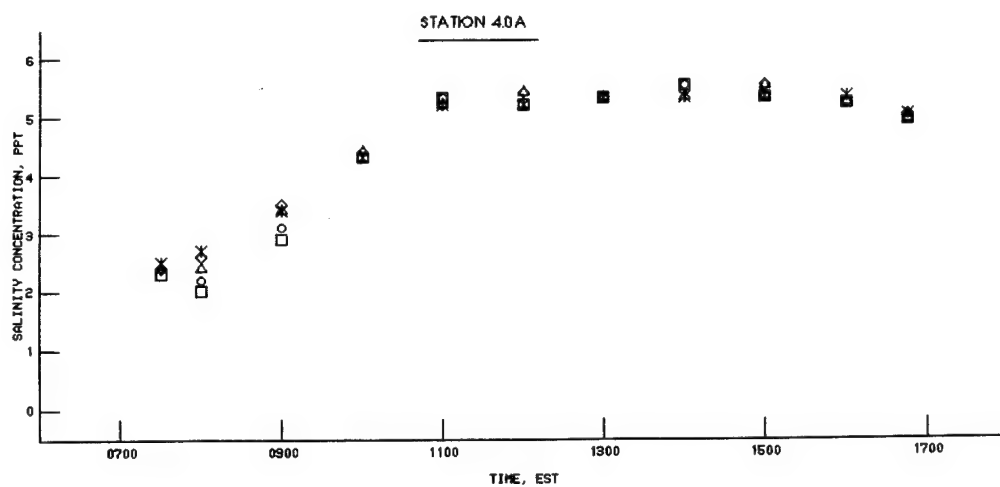
**SALINITY CONCENTRATION
STATIONS S4.0A AND S4.0B
10/19/92**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- × - BOTTOM

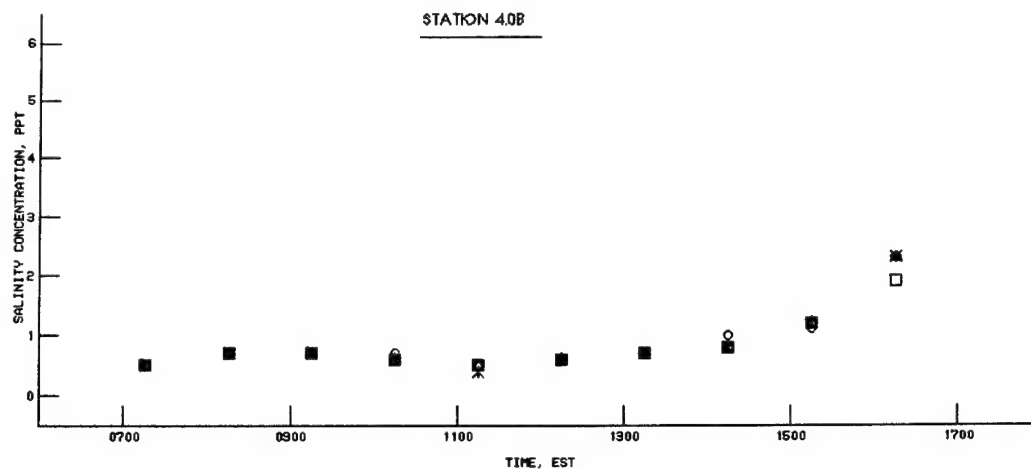
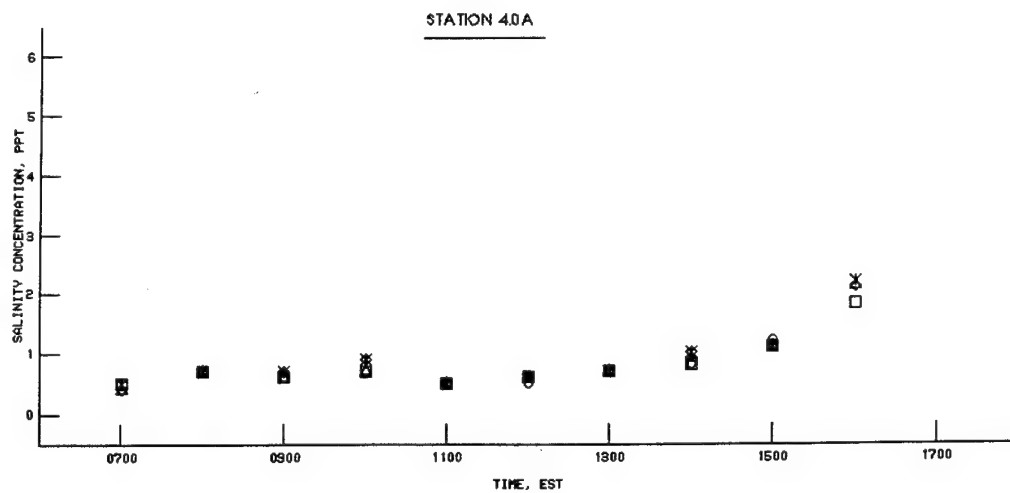
**SALINITY CONCENTRATION
STATIONS S4.0A AND S4.0B
10/21/92**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- × - BOTTOM

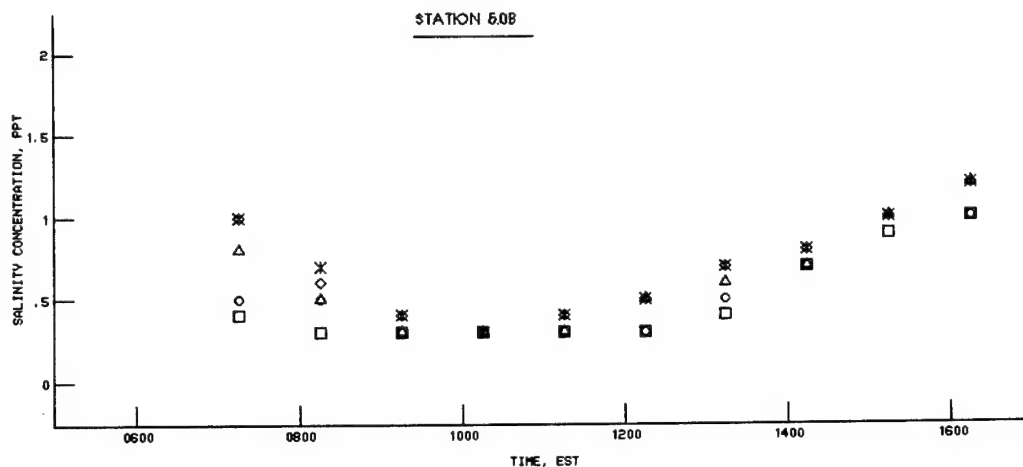
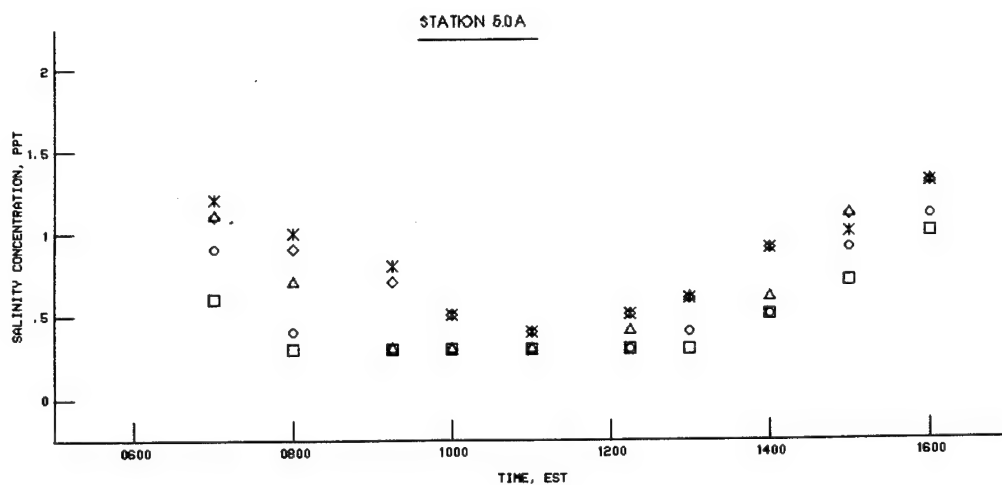
**SALINITY CONCENTRATION
STATIONS S4.0A AND S4.0B
10/23/92**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- ✕ - BOTTOM

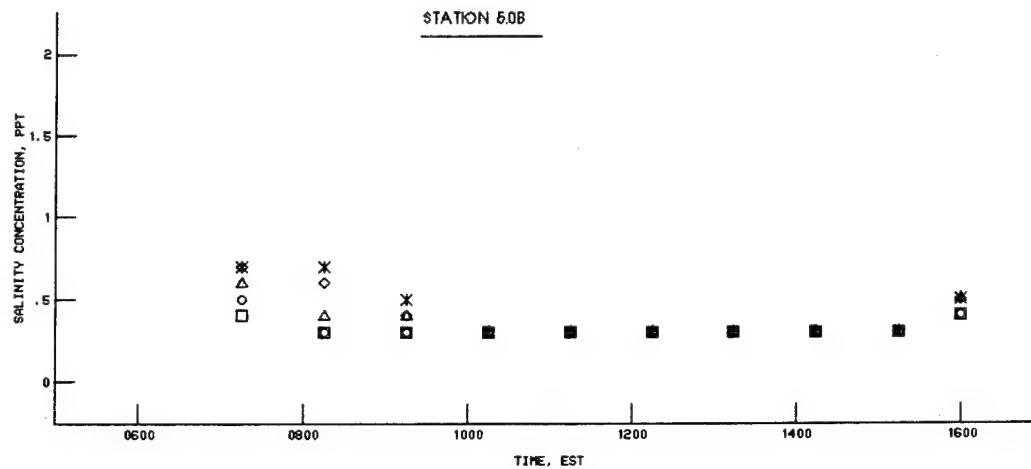
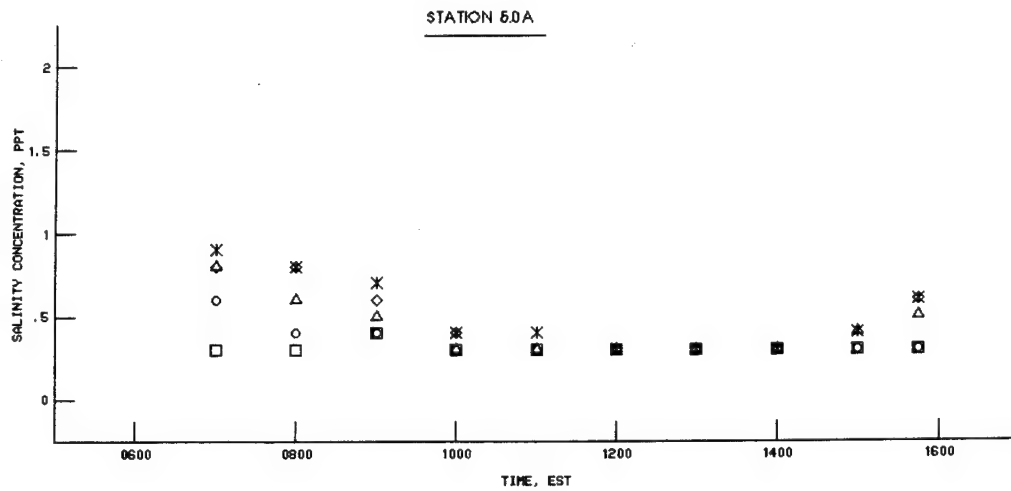
**SALINITY CONCENTRATION
STATIONS S4.0A AND S4.0B
10/25/92**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- * - BOTTOM

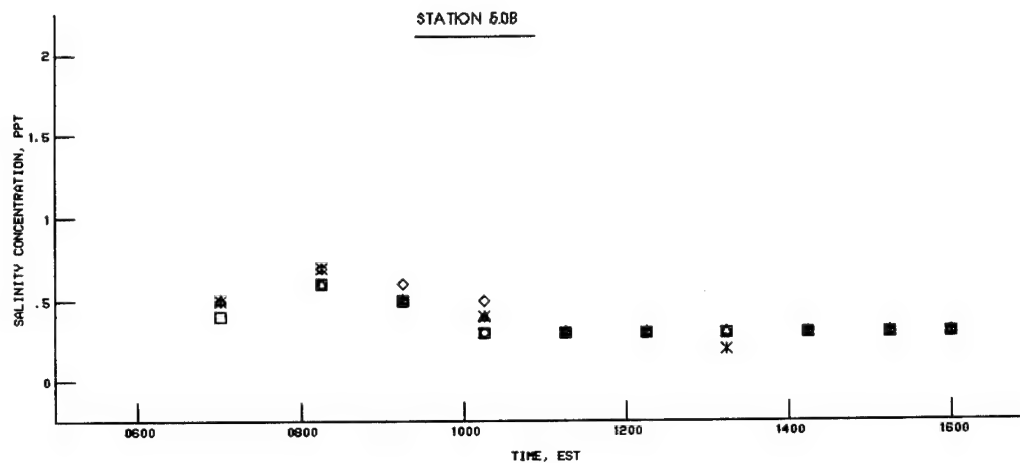
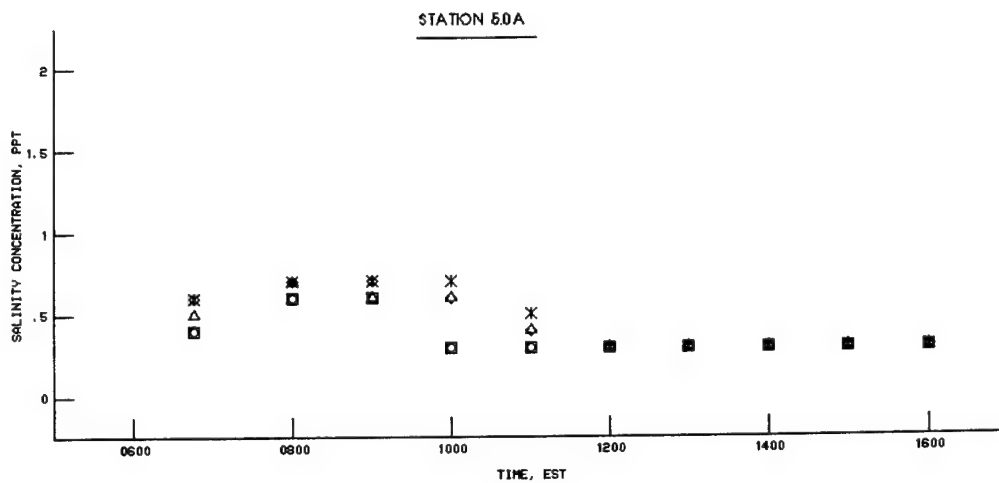
**SALINITY CONCENTRATION
STATIONS S5.0A AND S5.0B
10/14/92**



LEGEND

| | |
|---|-----------------------|
| □ | - SURFACE |
| ○ | - ONE-QUARTER DEPTH |
| △ | - MIDDEPTH |
| ◇ | - THREE-QUARTER DEPTH |
| ✱ | - BOTTOM |

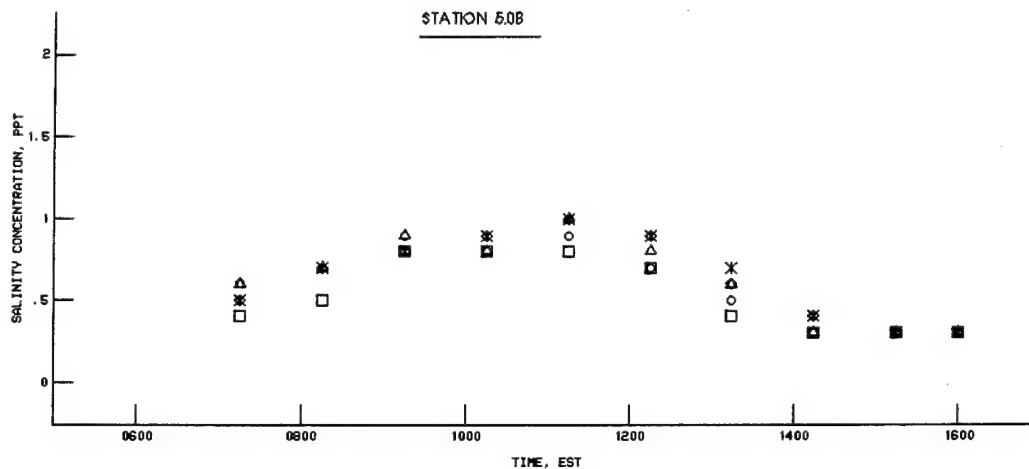
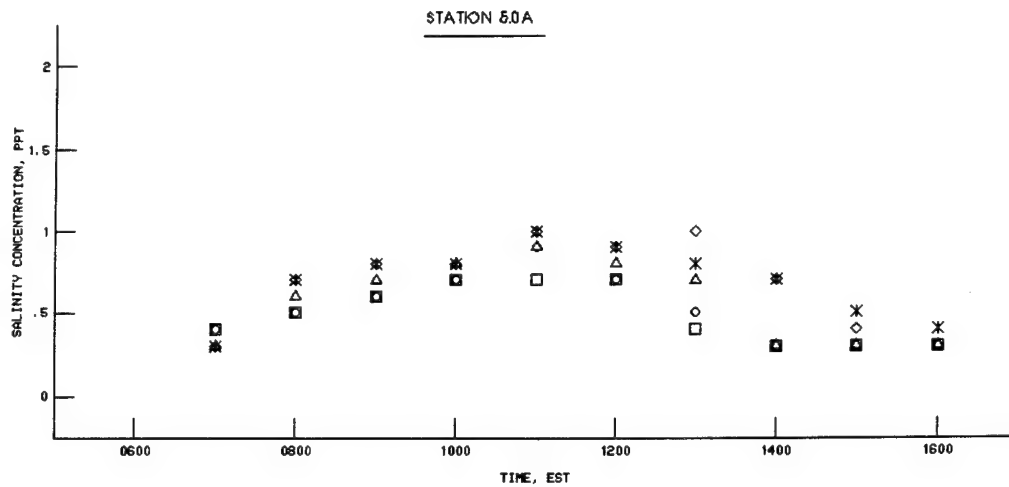
**SALINITY CONCENTRATION
STATIONS S5.0A AND S5.0B
10/16/92**



LEGEND

| | |
|---|-----------------------|
| □ | - SURFACE |
| ○ | - ONE-QUARTER DEPTH |
| △ | - MIDDEPTH |
| ◇ | - THREE-QUARTER DEPTH |
| ✱ | - BOTTOM |

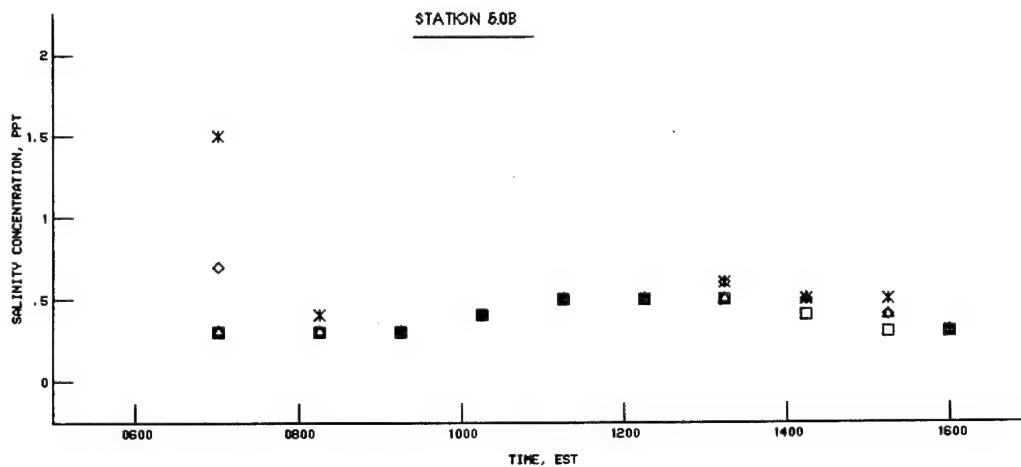
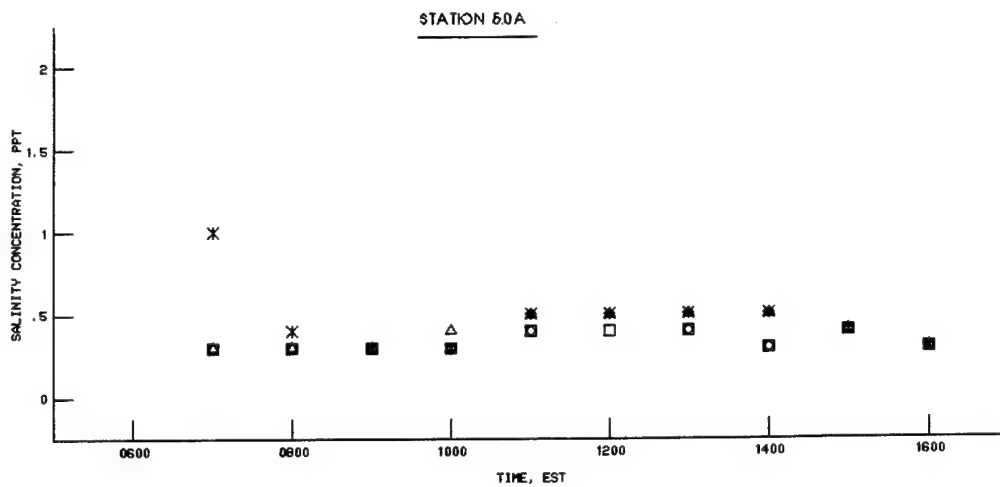
**SALINITY CONCENTRATION
STATIONS S5.0A AND S5.0B
10/18/92**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- ✱ - BOTTOM

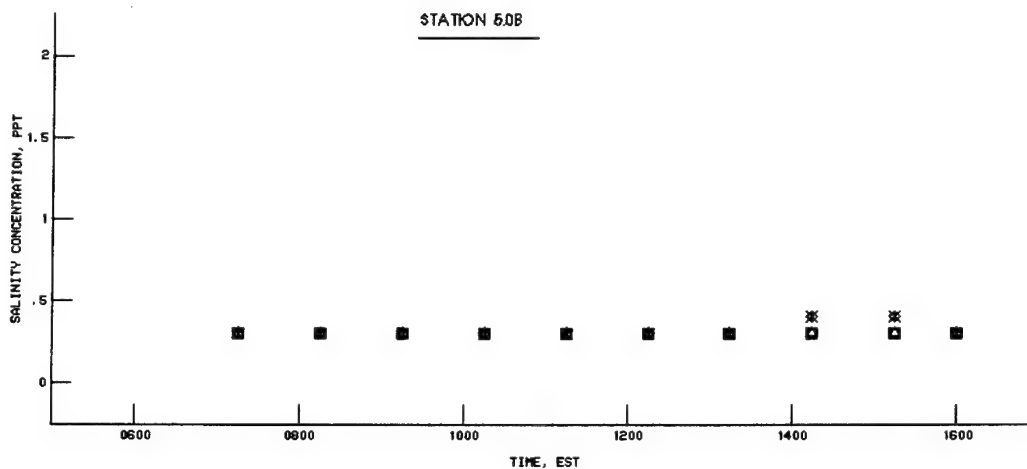
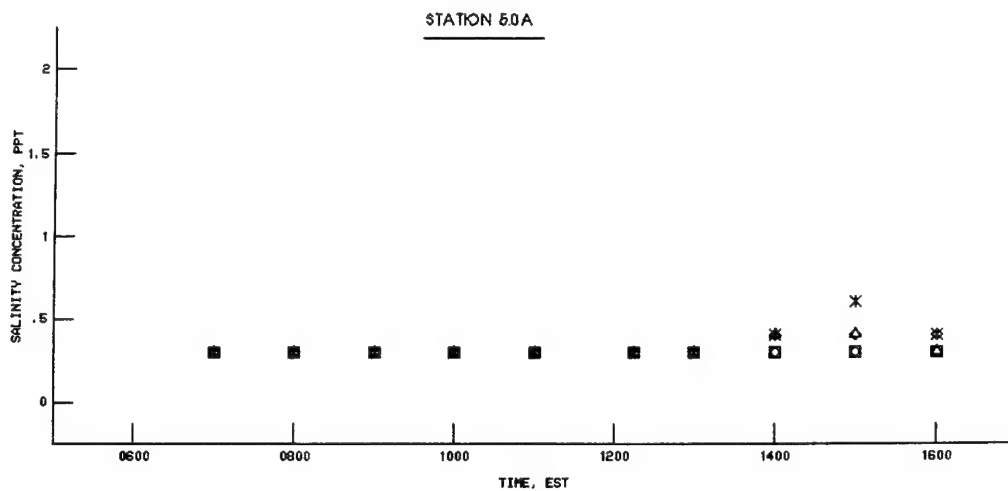
**SALINITY CONCENTRATION
STATIONS S5.0A AND S5.0B
10/20/92**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- ✕ - BOTTOM

**SALINITY CONCENTRATION
STATIONS S5.0A AND S5.0B
10/22/92**

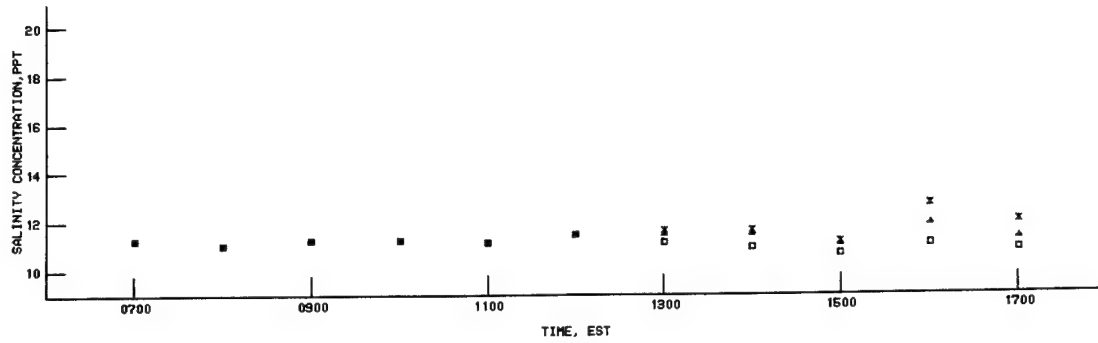


LEGEND

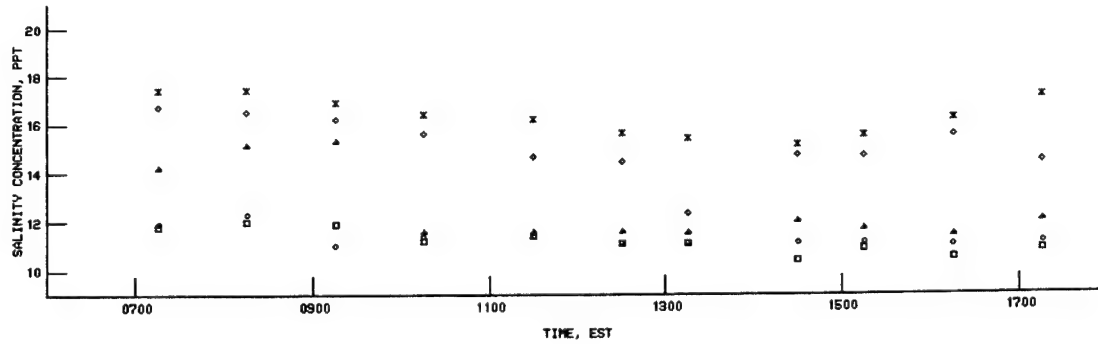
| | |
|---|-----------------------|
| □ | - SURFACE |
| ○ | - ONE-QUARTER DEPTH |
| △ | - MIDDEPTH |
| ◇ | - THREE-QUARTER DEPTH |
| ✱ | - BOTTOM |

**SALINITY CONCENTRATION
STATIONS S5.0A AND S5.0B
10/24/92**

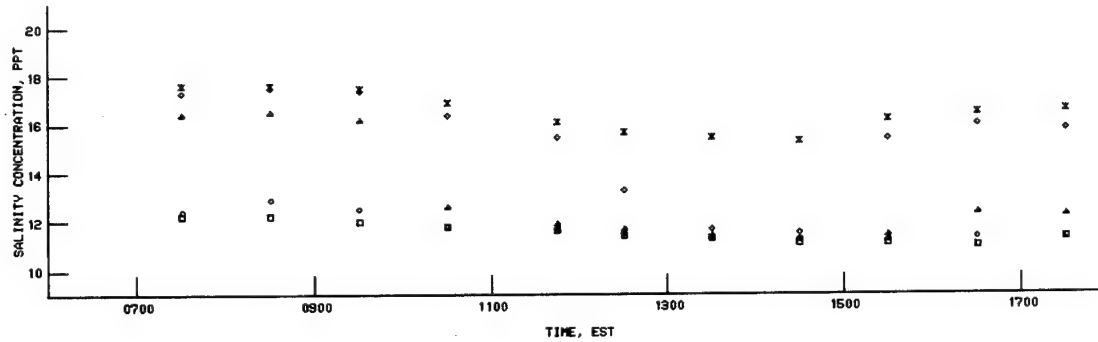
STATION 6.0A



STATION 6.0B



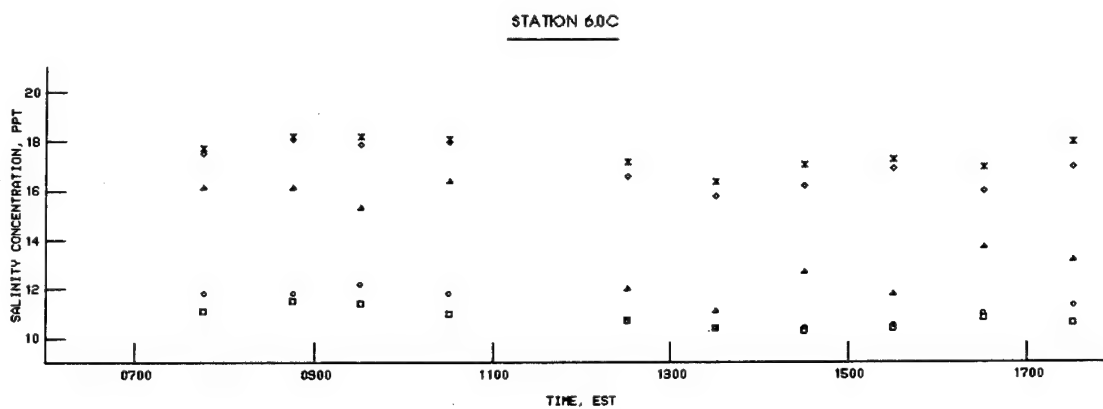
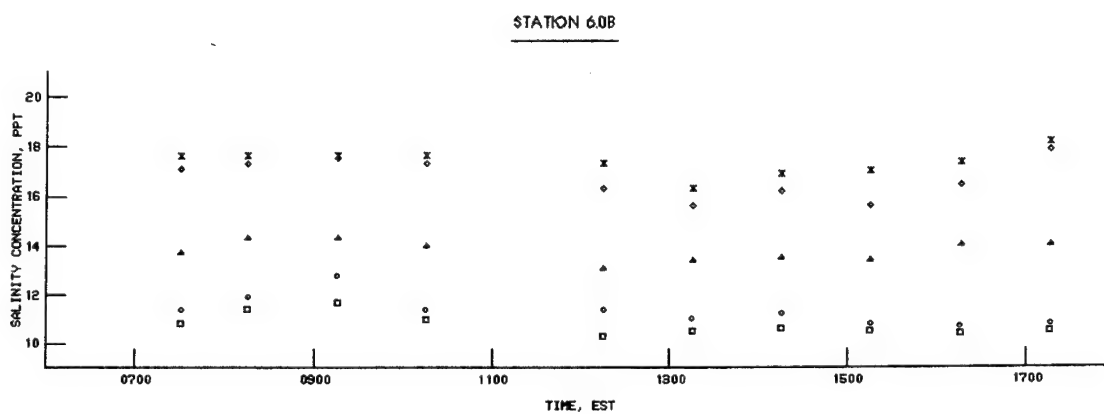
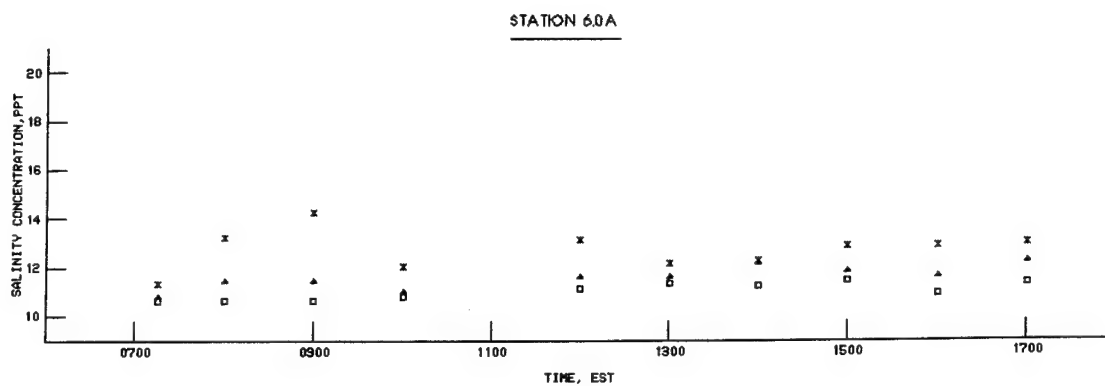
STATION 6.0C



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- × - BOTTOM

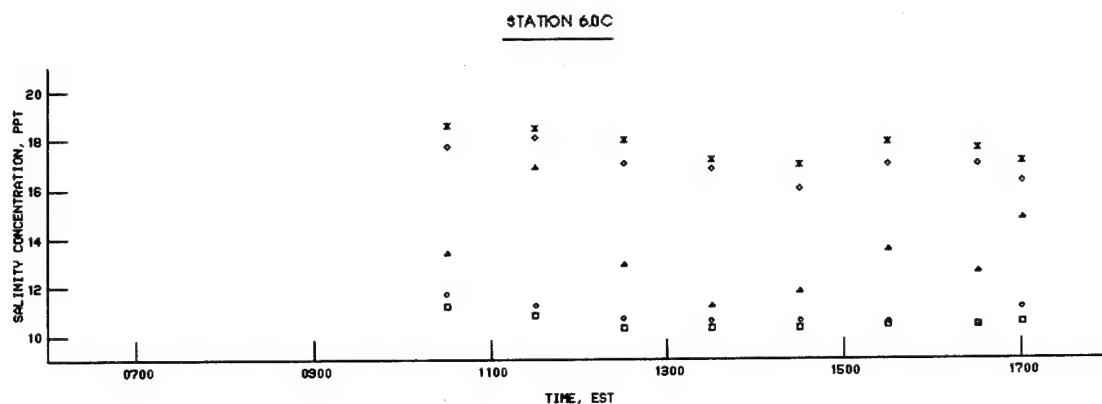
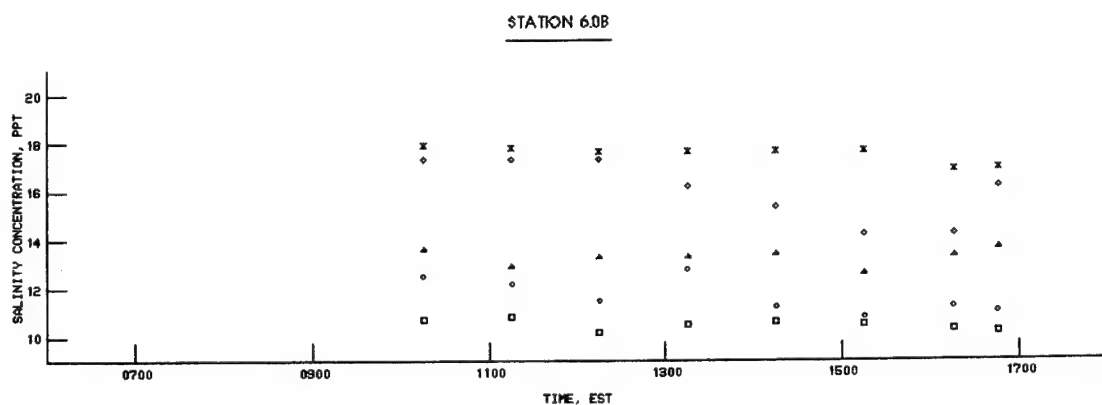
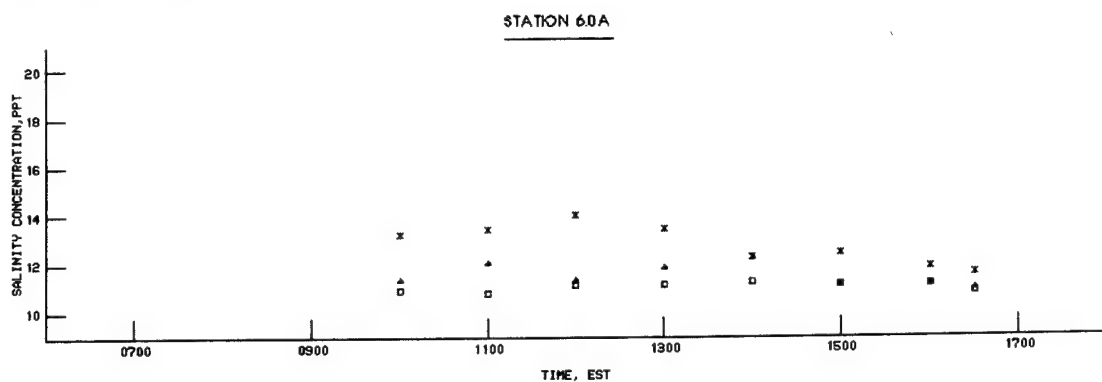
**SALINITY CONCENTRATION
STATIONS S6.0A, S6.0B, AND S6.0C
10/13/92**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- X - BOTTOM

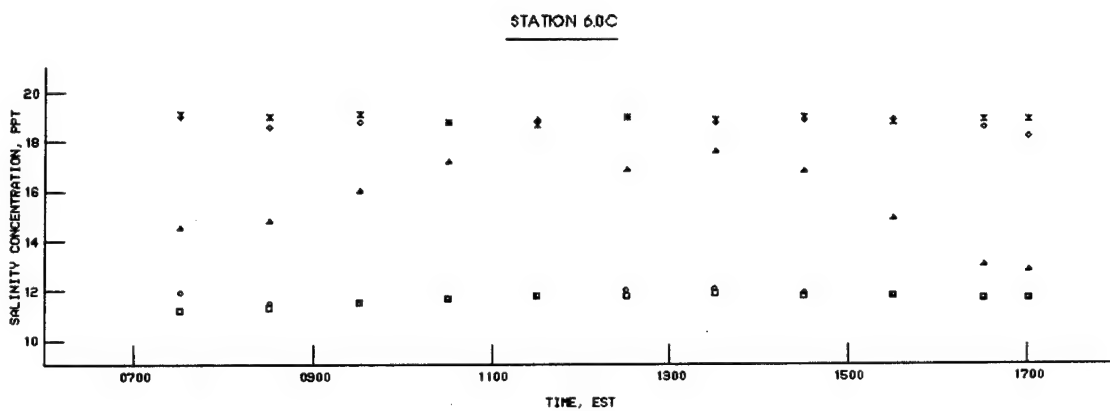
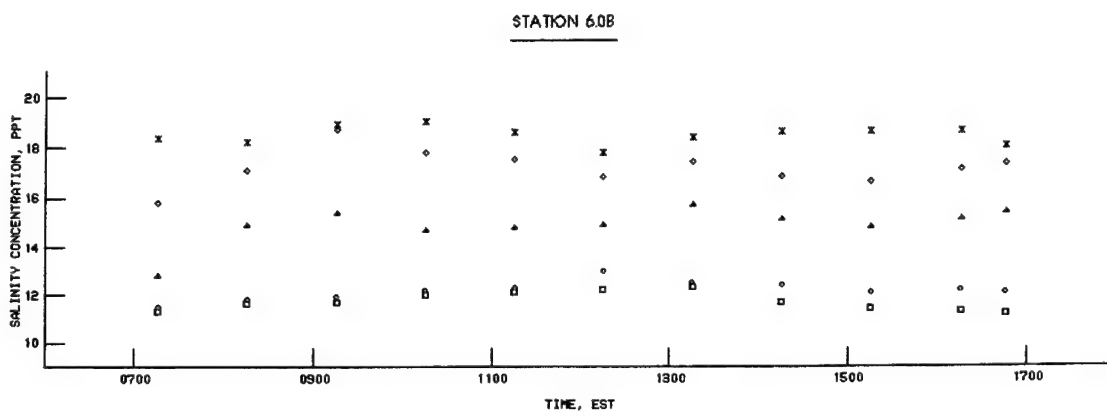
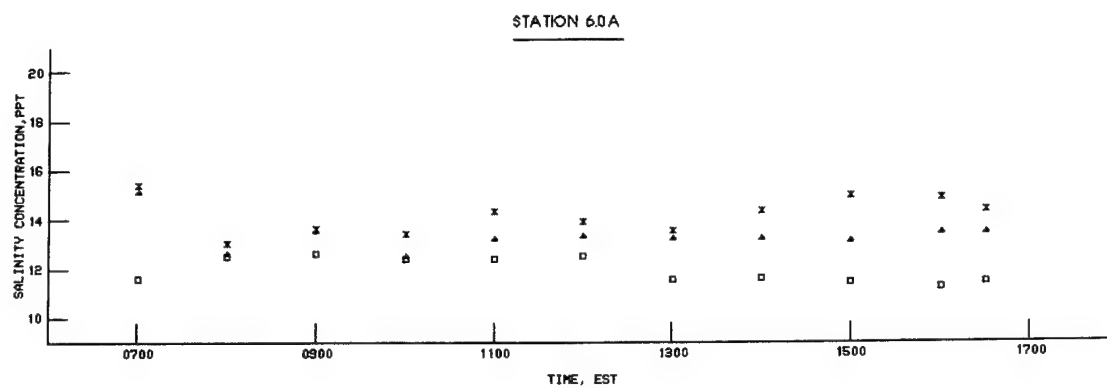
**SALINITY CONCENTRATION
STATIONS S6.0A, S6.0B, AND S6.0C
10/14/92**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- × - BOTTOM

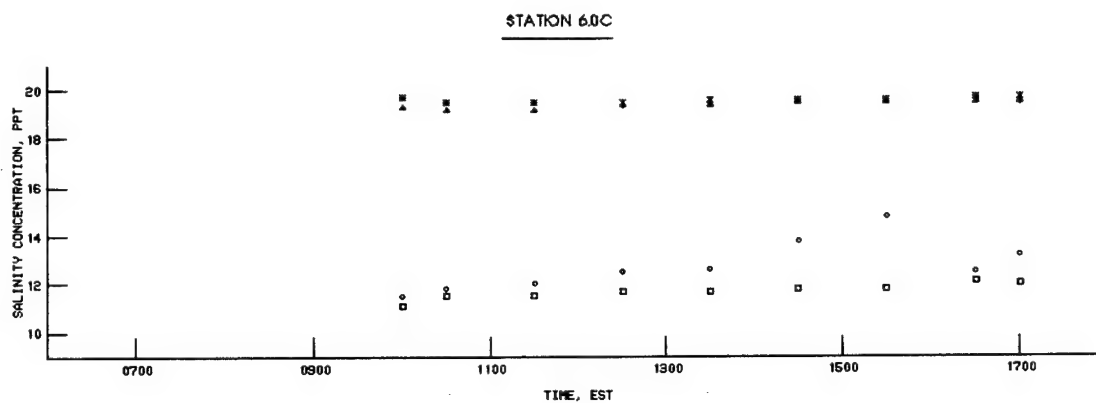
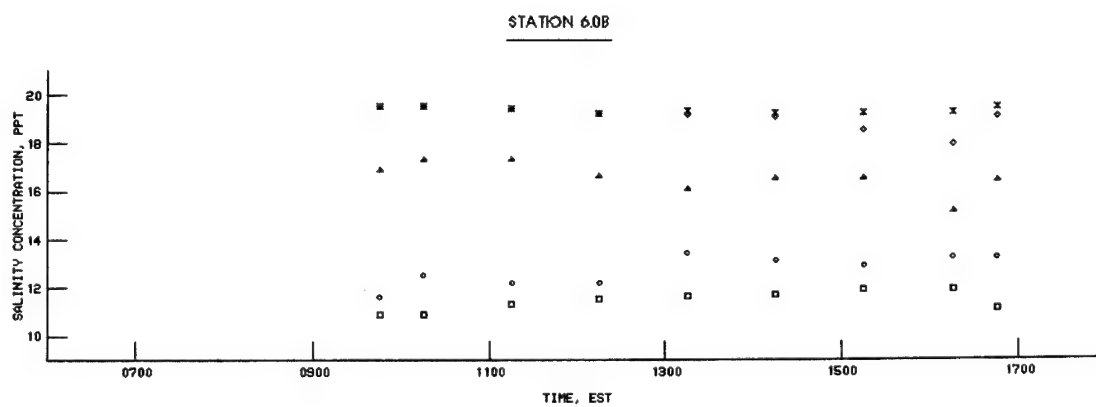
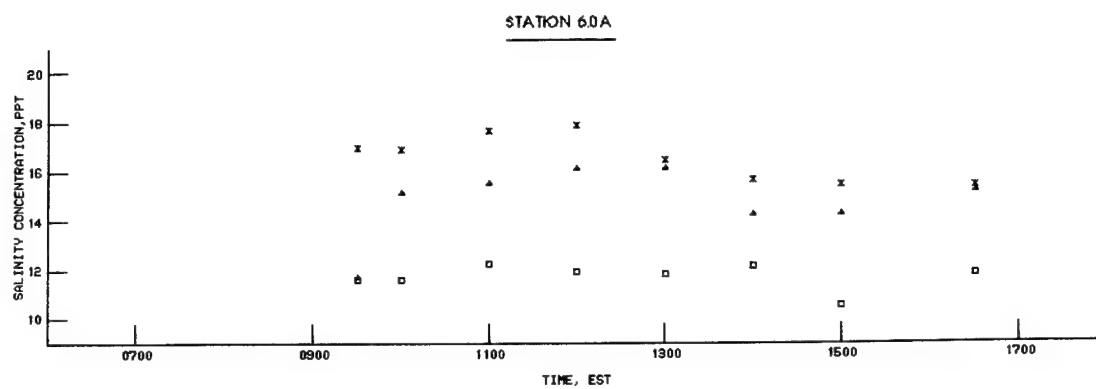
**SALINITY CONCENTRATION
STATIONS S6.0A, S6.0B, AND S6.0C
10/15/92**



LEGEND

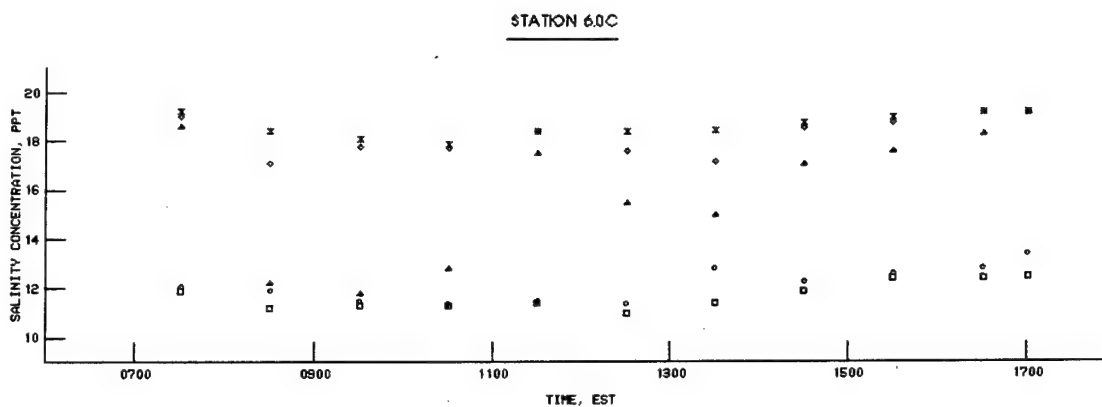
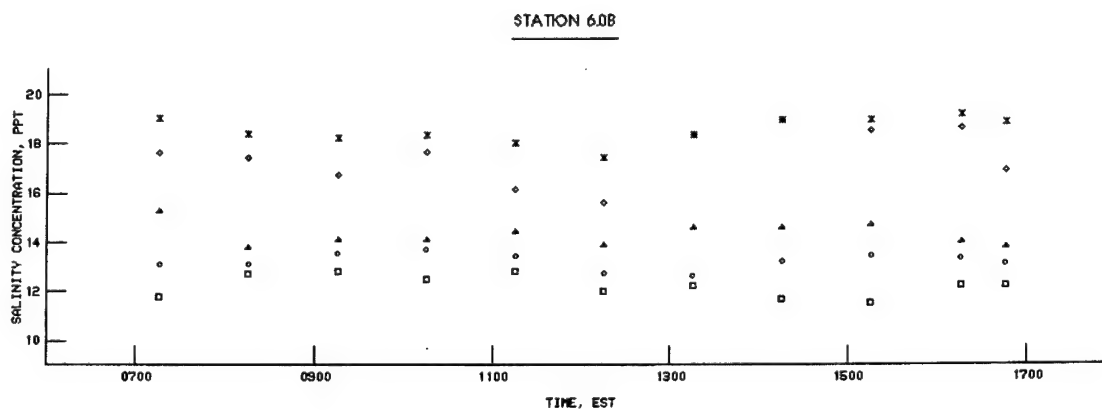
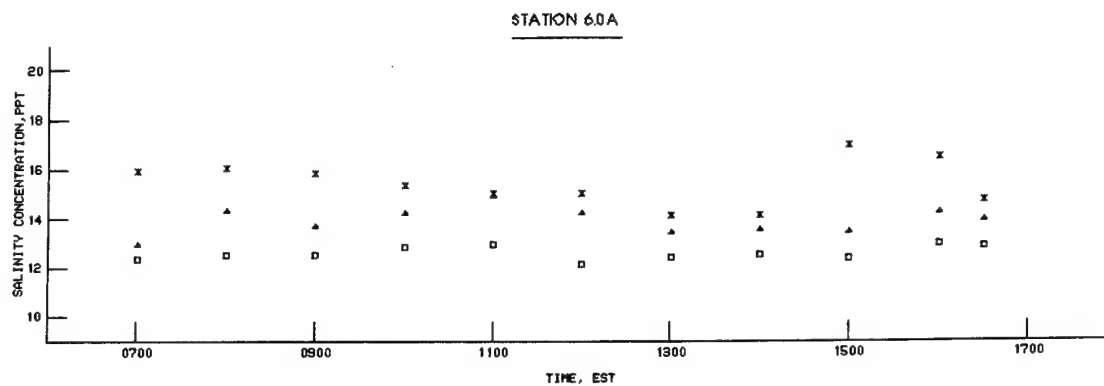
- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- X - BOTTOM

**SALINITY CONCENTRATION
STATIONS S6.0A, S6.0B, AND S6.0C
10/18/92**



- LEGEND**
- - SURFACE
 - - ONE-QUARTER DEPTH
 - △ - MIDDEPTH
 - ◇ - THREE-QUARTER DEPTH
 - ✕ - BOTTOM

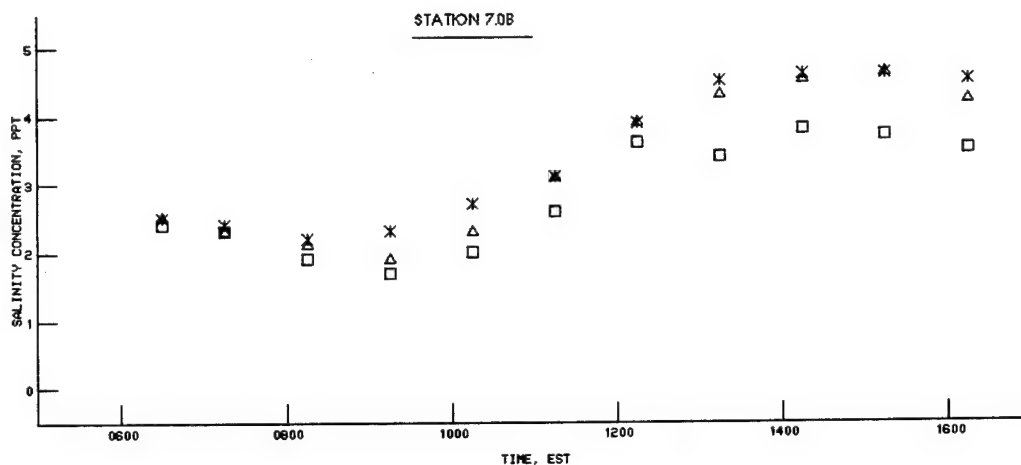
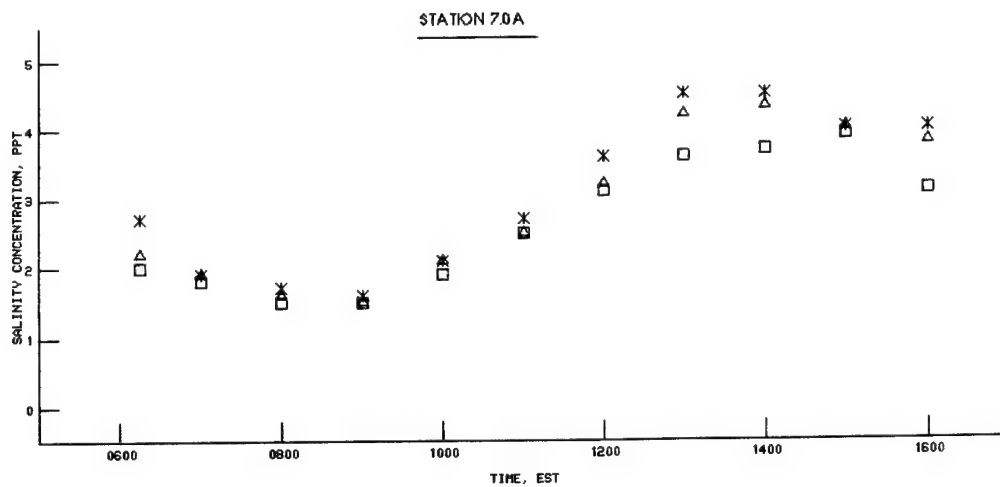
**SALINITY CONCENTRATION
STATIONS S6.0A, S6.0B, AND S6.0C
10/20/92**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- ✕ - BOTTOM

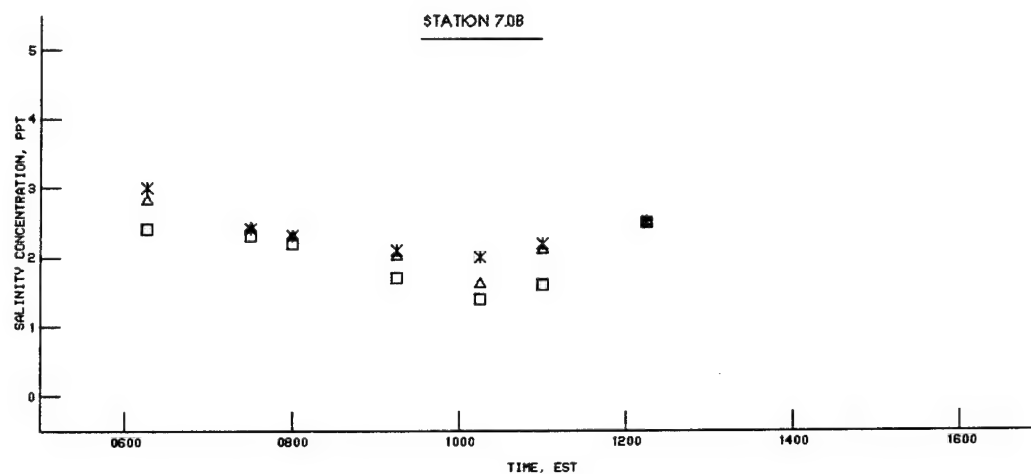
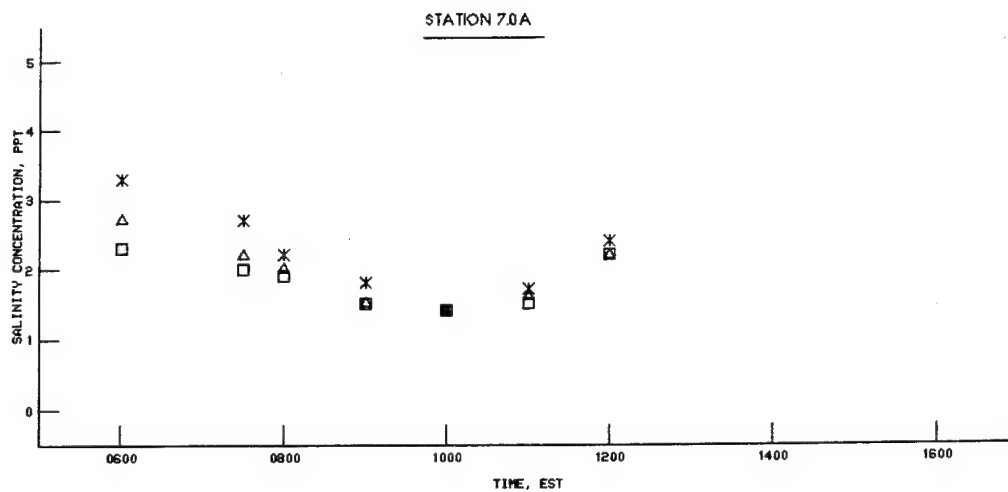
**SALINITY CONCENTRATION
STATIONS S6.0A, S6.0B, AND S6.0C
10/23/92**



LEGEND

- - SURFACE
- △ - MIDDEPTH
- * - BOTTOM

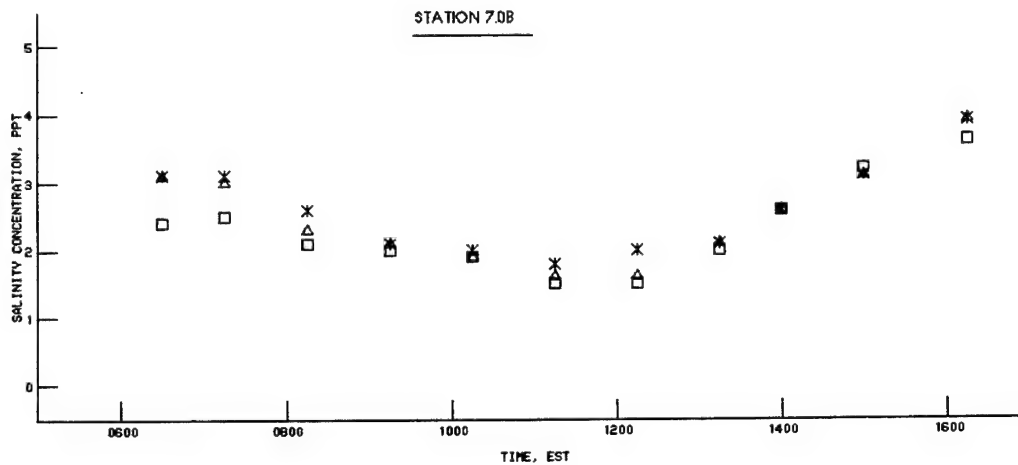
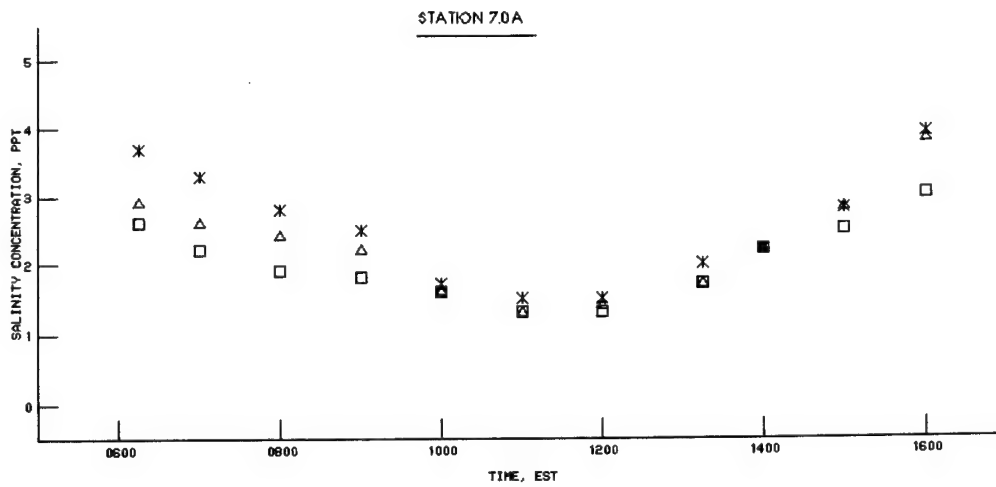
**SALINITY CONCENTRATION
STATIONS S7.0A AND S7.0B
10/14/92**



LEGEND

□ - SURFACE
 △ - MIDDEPTH
 × - BOTTOM

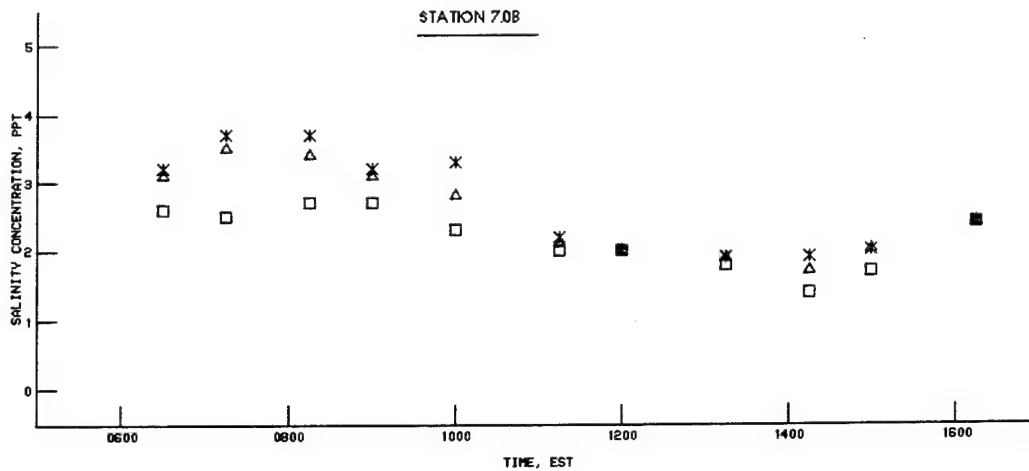
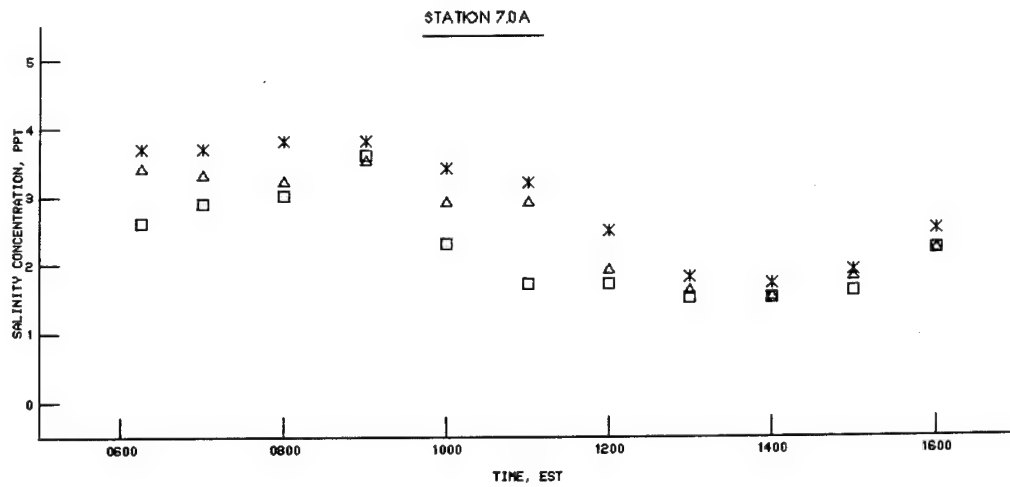
**SALINITY CONCENTRATION
 STATIONS S7.0A AND S7.0B
 10/16/92**



LEGEND

| | |
|---|------------|
| □ | - SURFACE |
| △ | - MIDDEPTH |
| × | - BOTTOM |

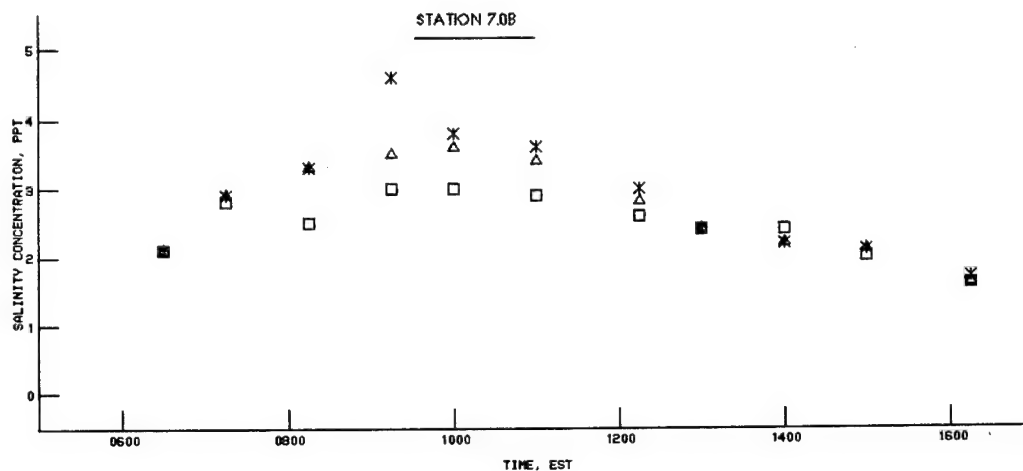
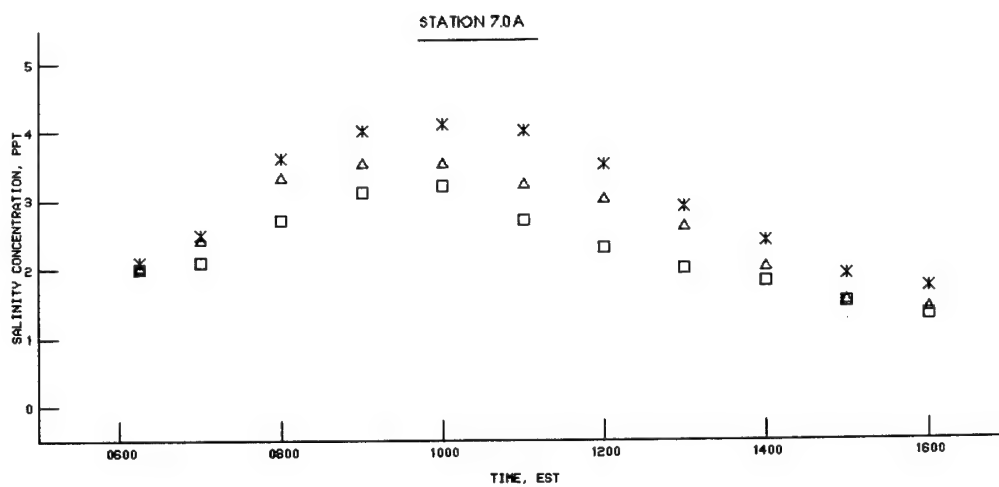
**SALINITY CONCENTRATION
STATIONS S7.0A AND S7.0B
10/18/92**



LEGEND

- - SURFACE
- △ - MIDDEPTH
- × - BOTTOM

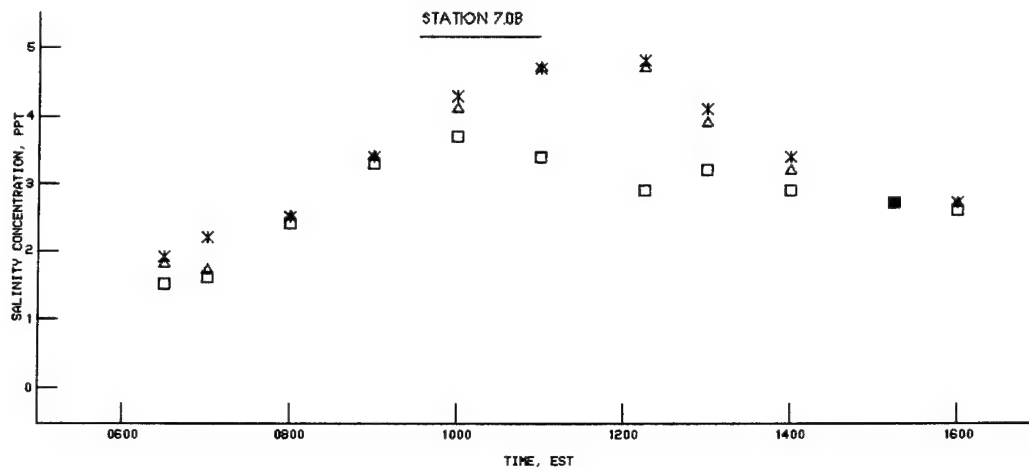
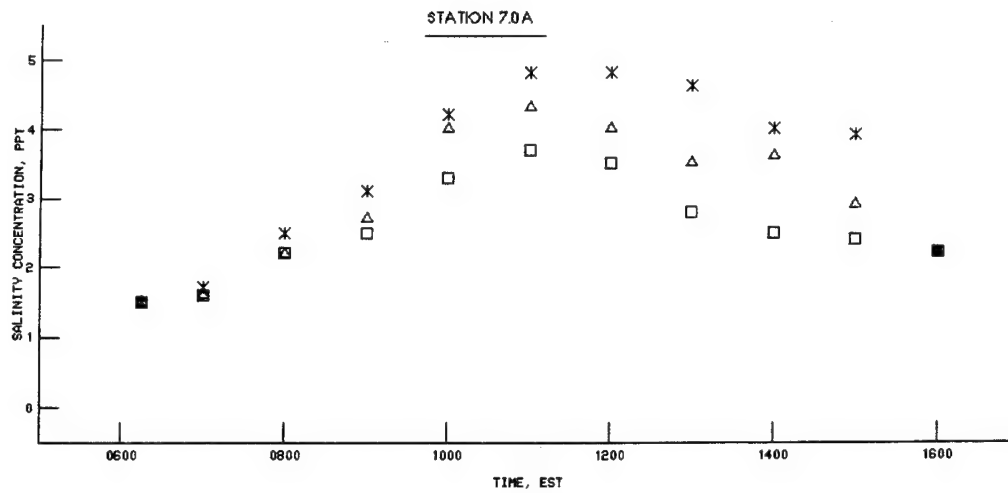
**SALINITY CONCENTRATION
STATIONS S7.0A AND S7.0B
10/20/92**



LEGEND

□ - SURFACE
 △ - MIDDEPTH
 ✕ - BOTTOM

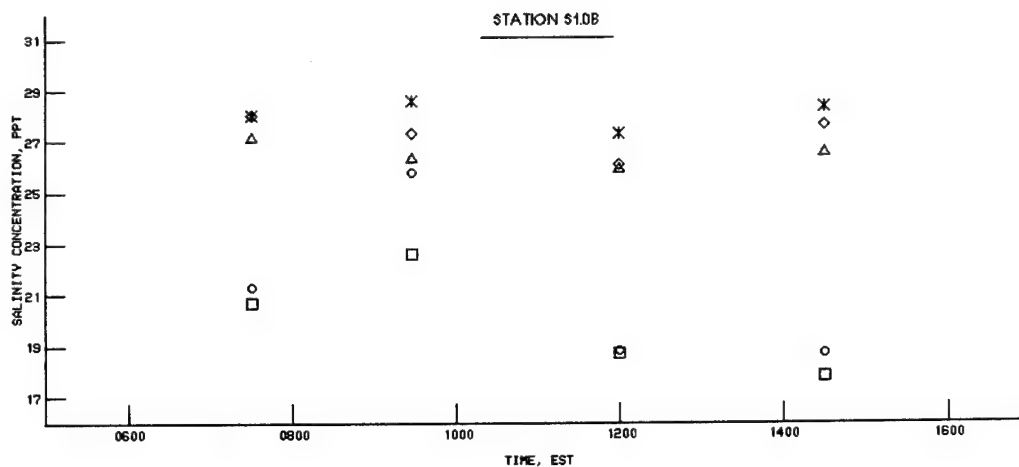
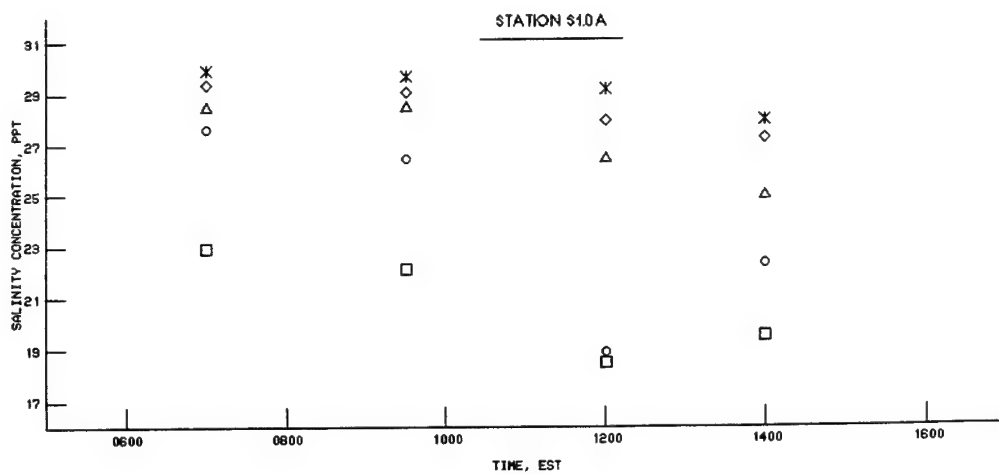
SALINITY CONCENTRATION
STATIONS S7.0A AND S7.0B
10/22/92



LEGEND

□ - SURFACE
 △ - MIDDEPTH
 * - BOTTOM

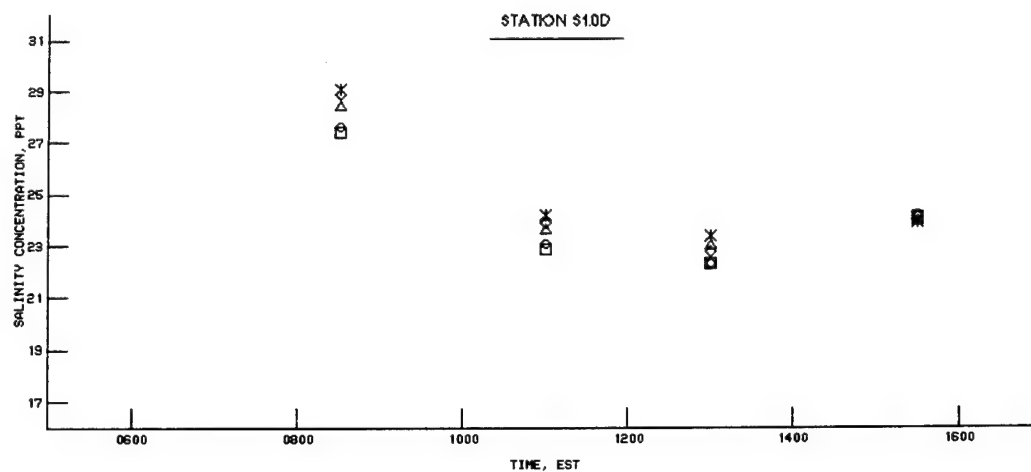
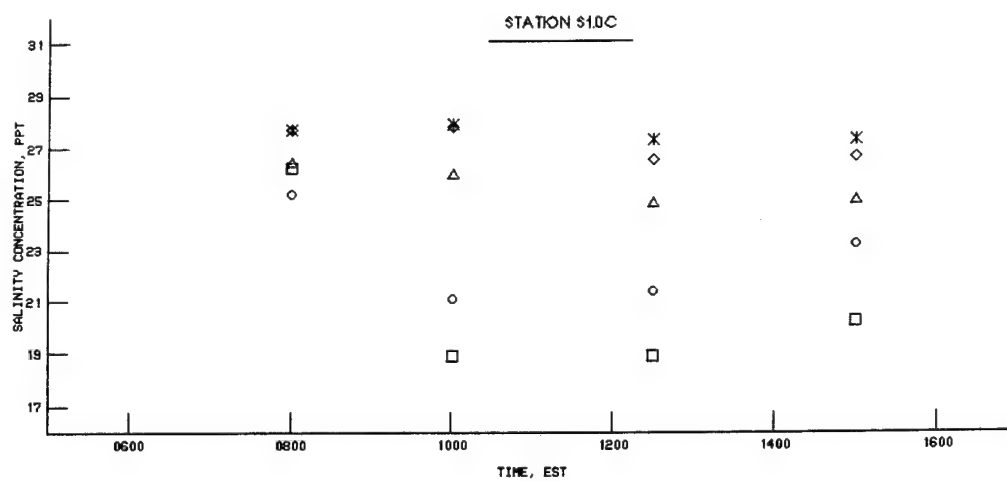
**SALINITY CONCENTRATION
 STATIONS S7.0A AND S7.0B
 10/24/92**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- ✱ - BOTTOM

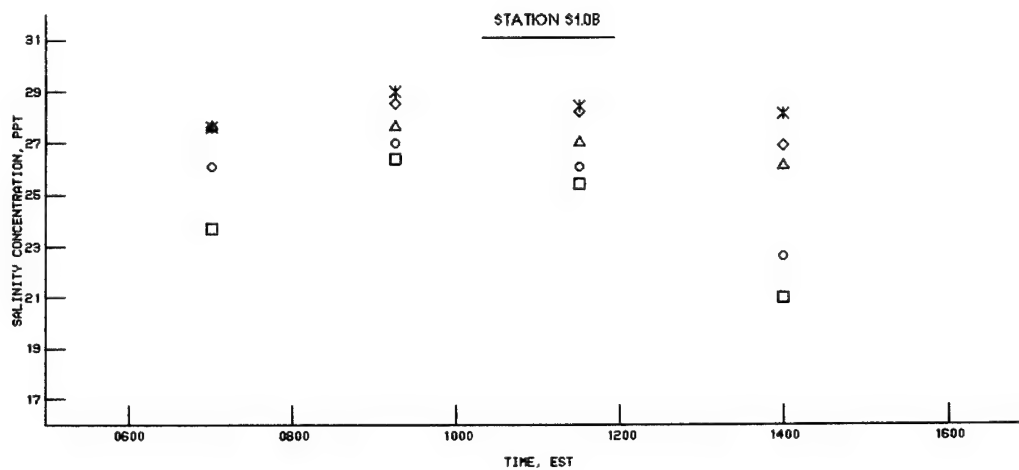
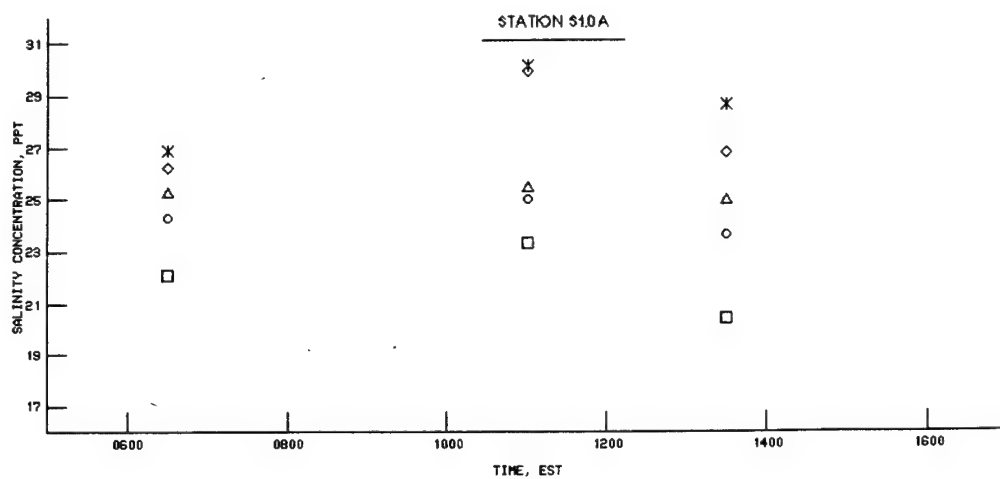
**SALINITY CONCENTRATION
STATIONS S1.0A AND S1.0B
04/19/93**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- ✱ - BOTTOM

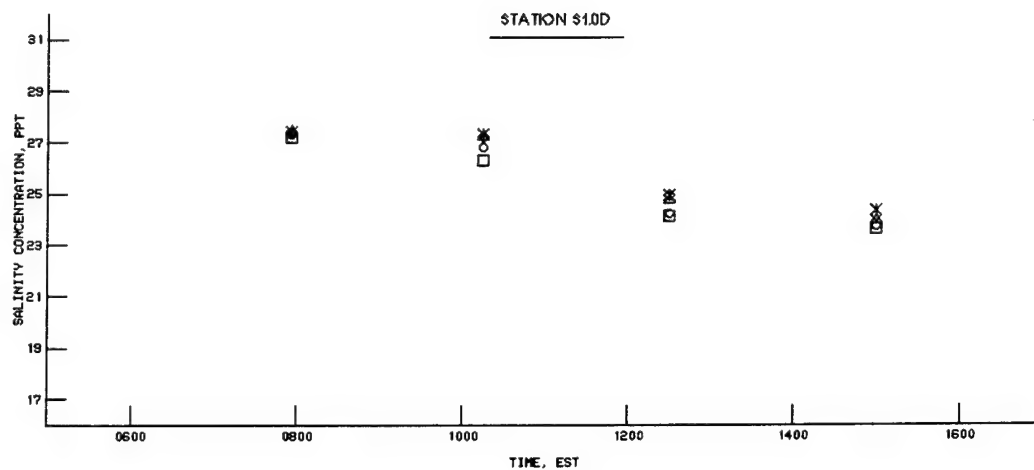
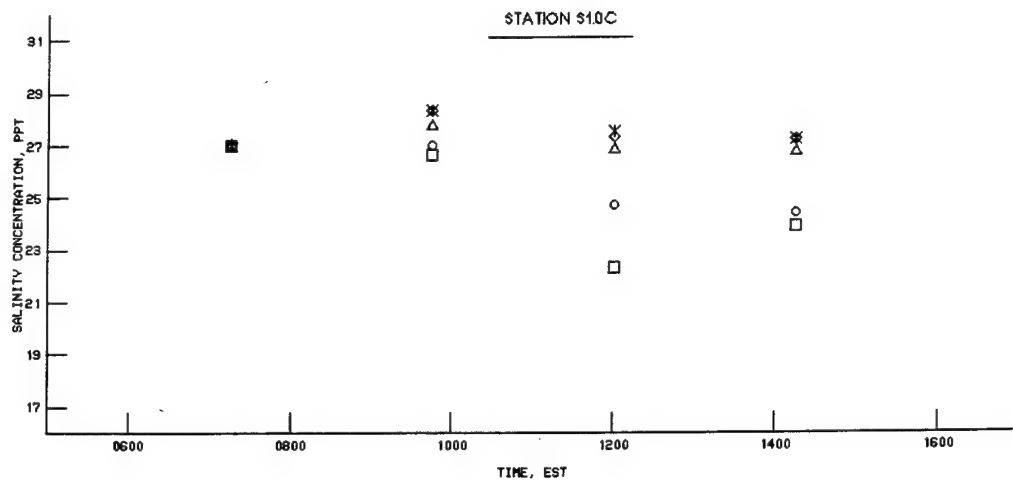
**SALINITY CONCENTRATION
STATIONS S1.0C AND S1.0D
04/19/93**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- ✕ - BOTTOM

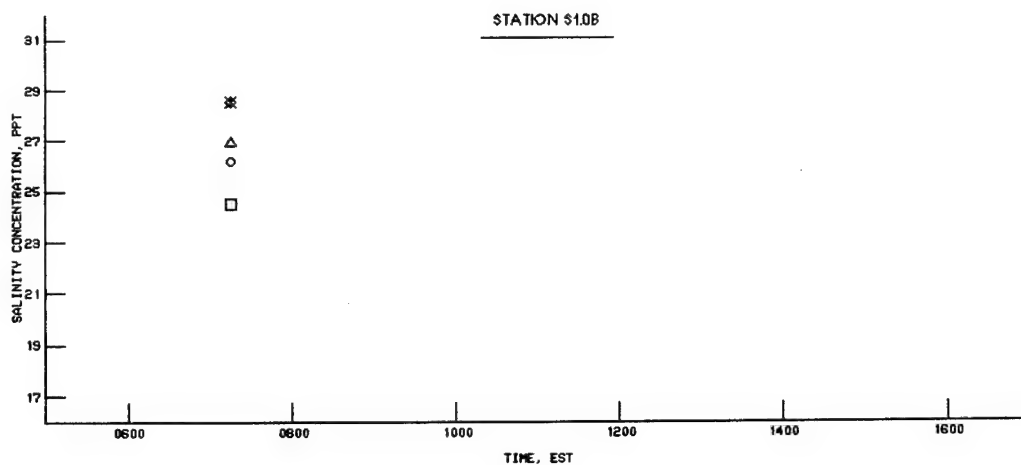
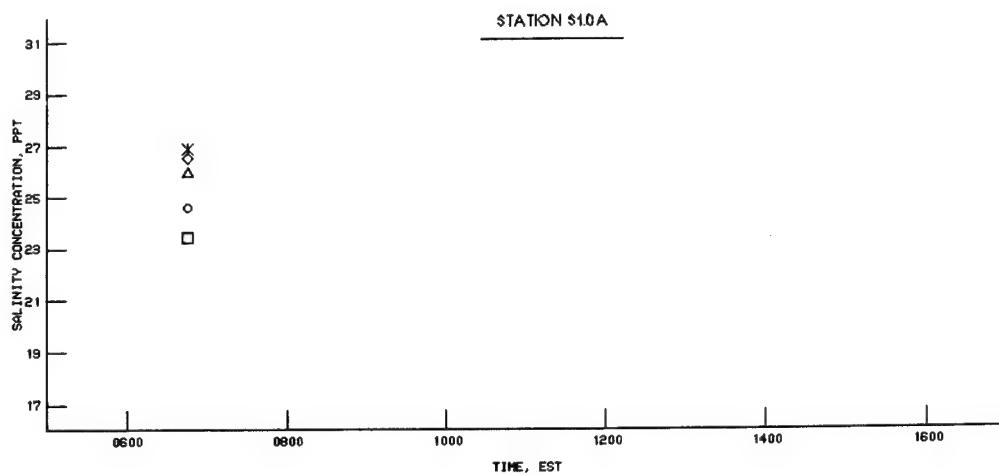
**SALINITY CONCENTRATION
STATIONS S1.0A AND S1.0B
04/21/93**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- ✕ - BOTTOM

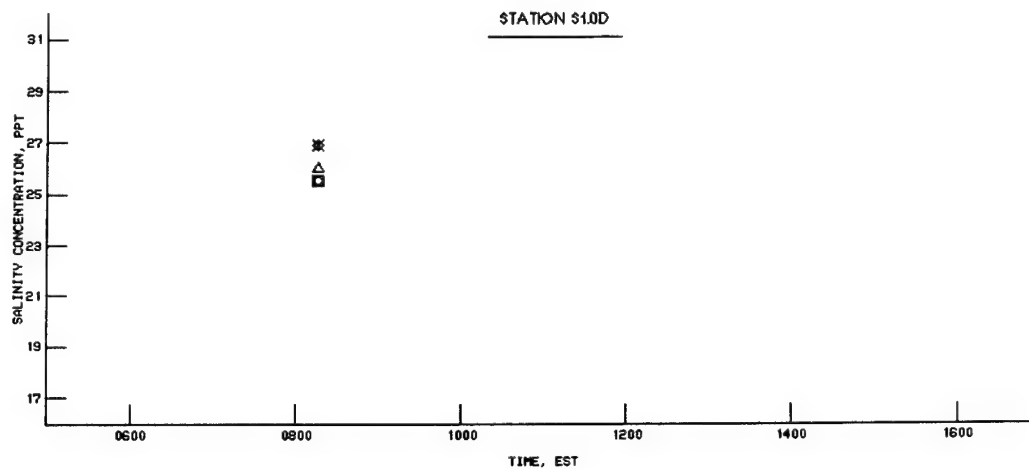
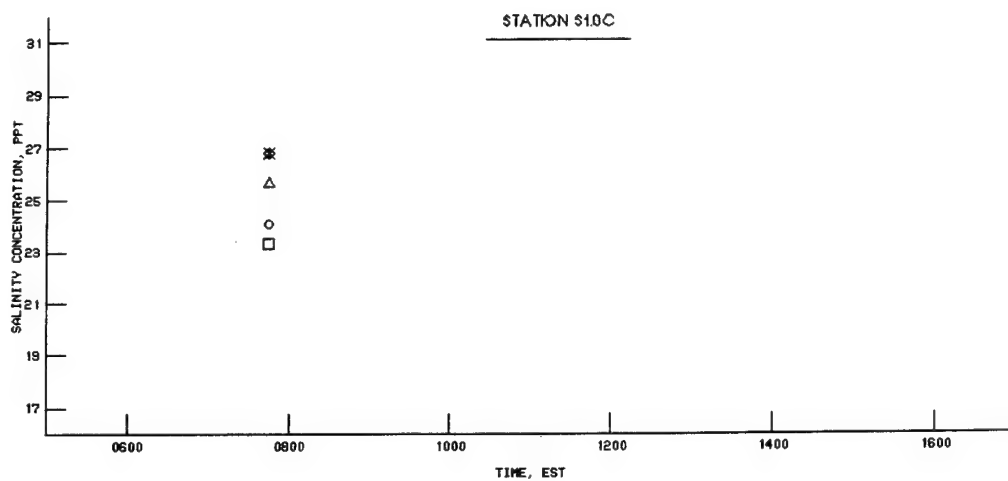
**SALINITY CONCENTRATION
STATIONS S1.0C AND S1.0D
04/21/93**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- ✕ - BOTTOM

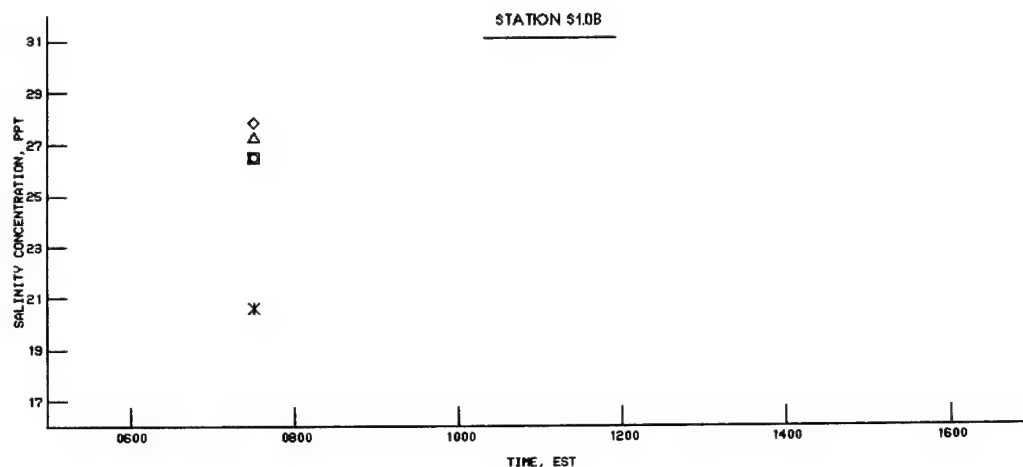
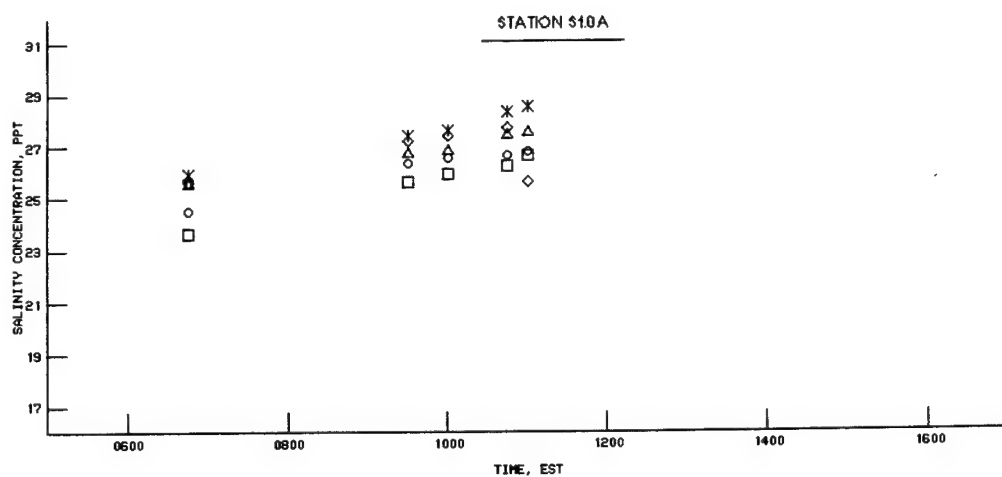
**SALINITY CONCENTRATION
STATIONS S1.0A AND S1.0B
04/24/93**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- ✱ - BOTTOM

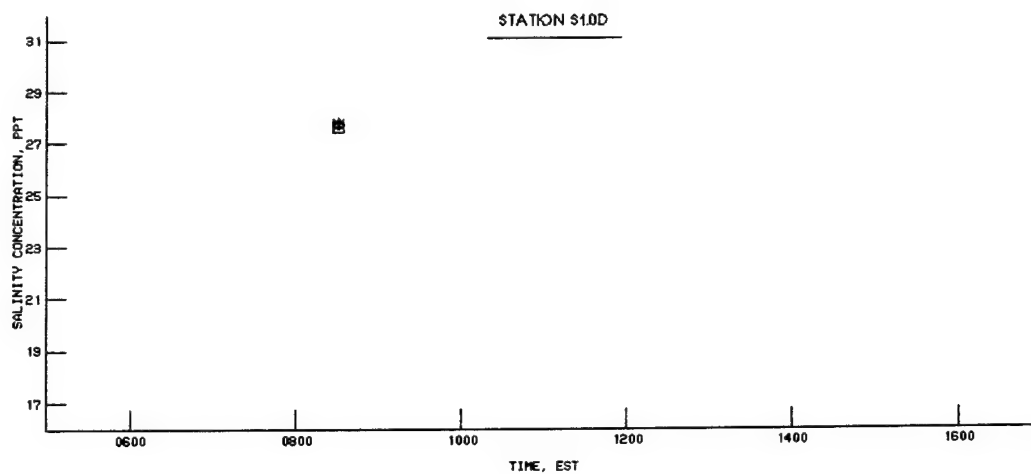
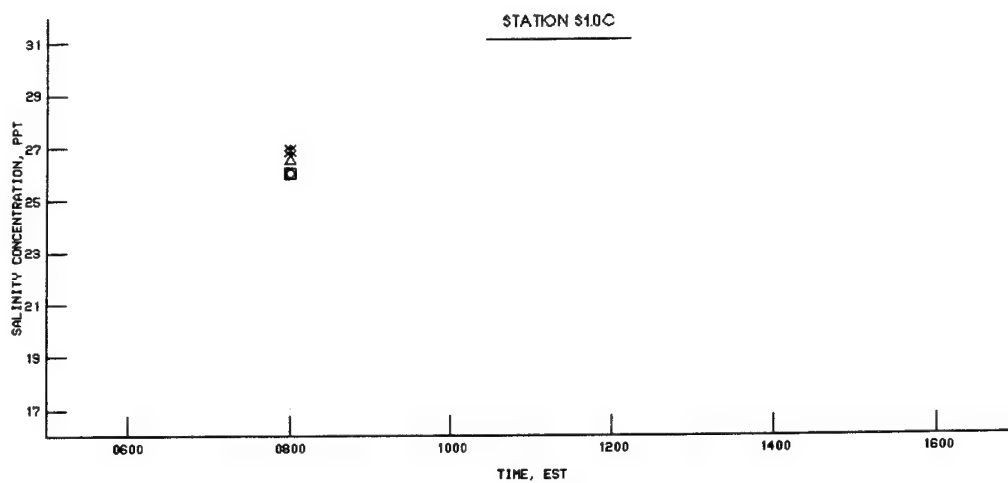
**SALINITY CONCENTRATION
STATIONS S1.0C AND S1.0D
04/24/93**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- × - BOTTOM

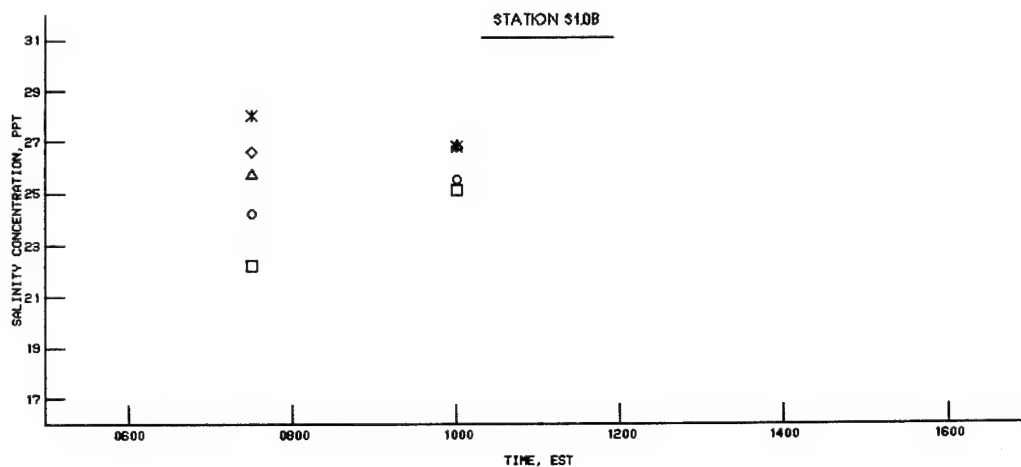
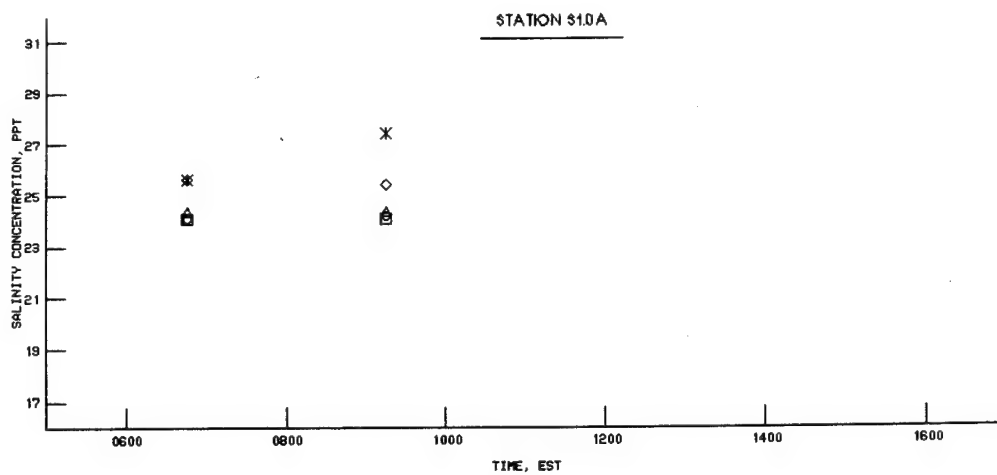
**SALINITY CONCENTRATION
STATIONS S1.0A AND S1.0B
04/25/93**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- ✕ - BOTTOM

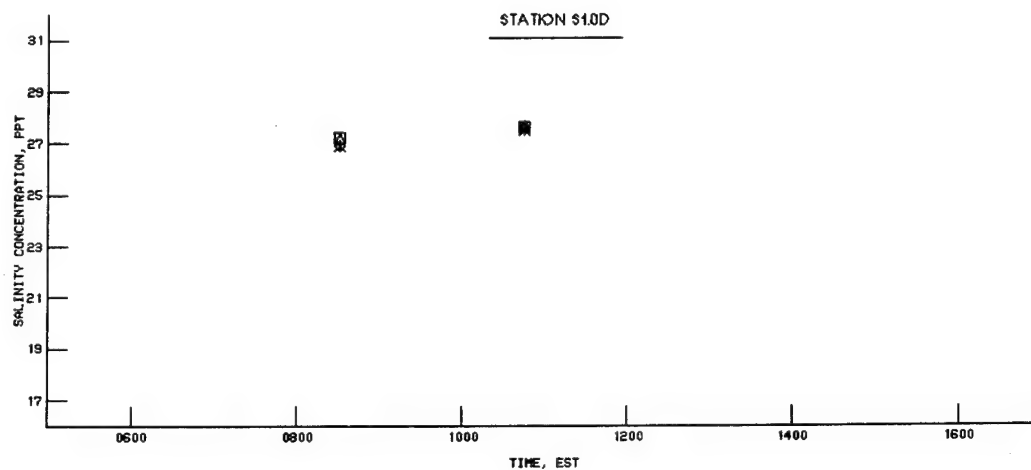
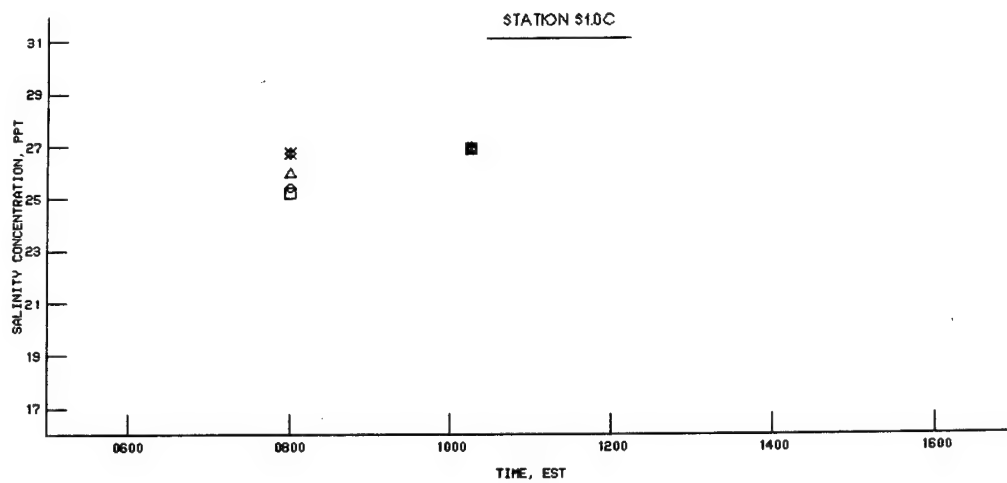
**SALINITY CONCENTRATION
STATIONS S1.0C AND S1.0D
04/25/93**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- ✕ - BOTTOM

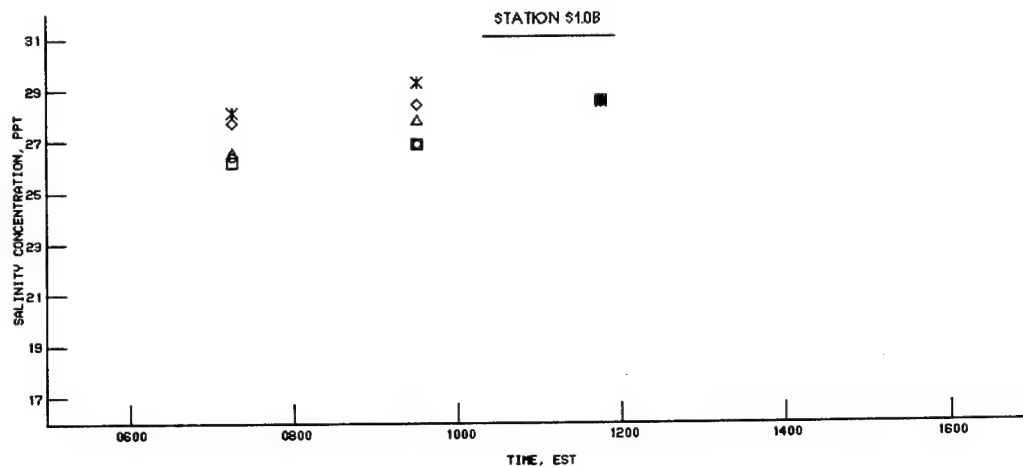
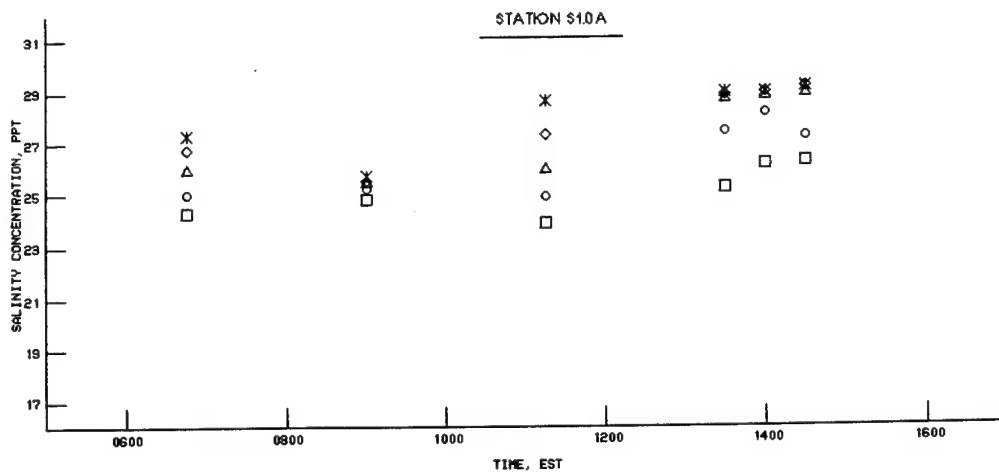
**SALINITY CONCENTRATION
STATIONS S1.0A AND S1.0B
04/26/93**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- ✕ - BOTTOM

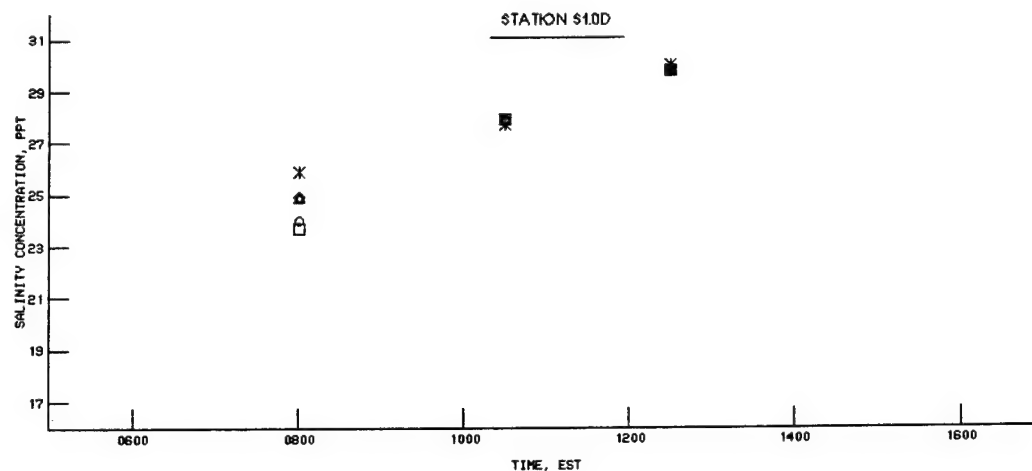
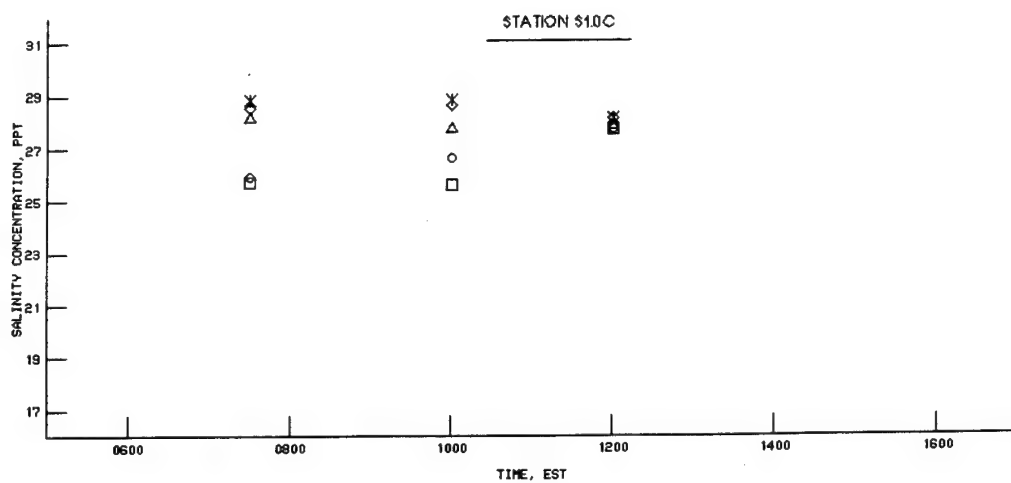
**SALINITY CONCENTRATION
STATIONS S1.0C AND 1.0D
04/26/93**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- ✱ - BOTTOM

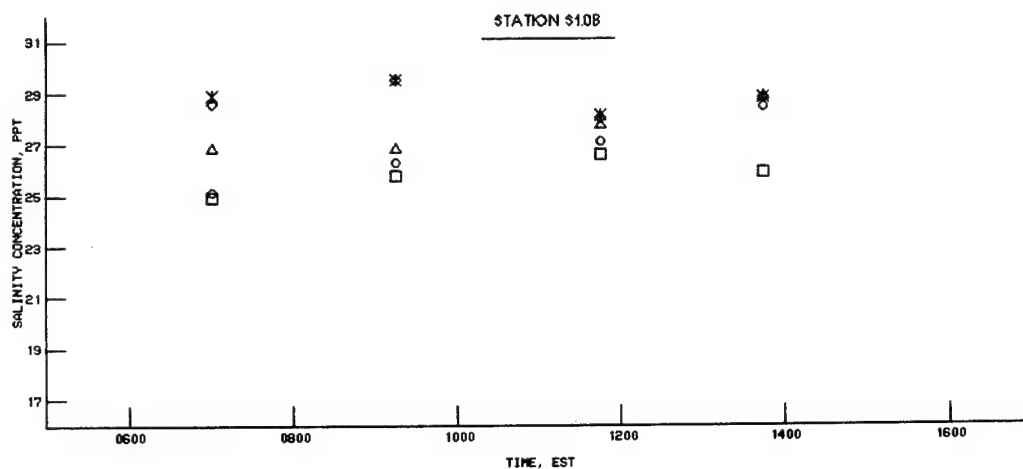
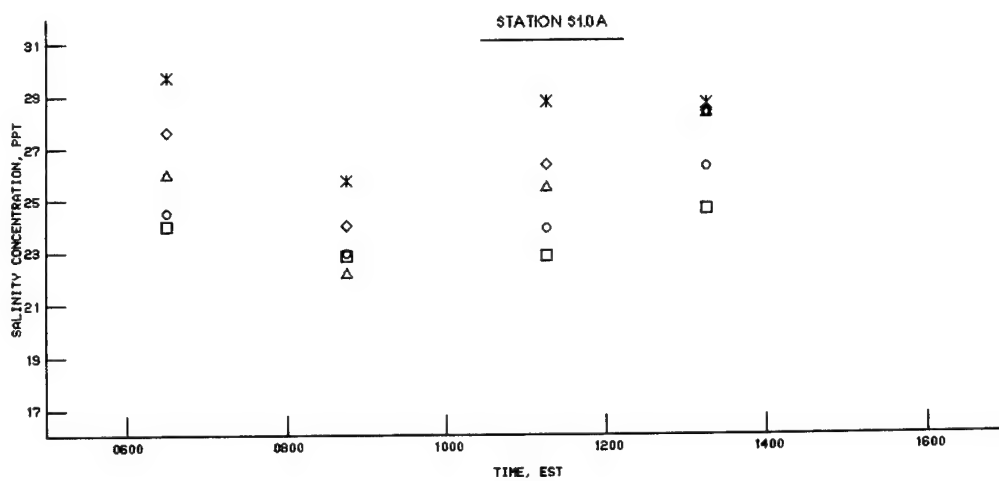
**SALINITY CONCENTRATION
STATIONS S1.0A AND S1.0B
04/28/93**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- ✕ - BOTTOM

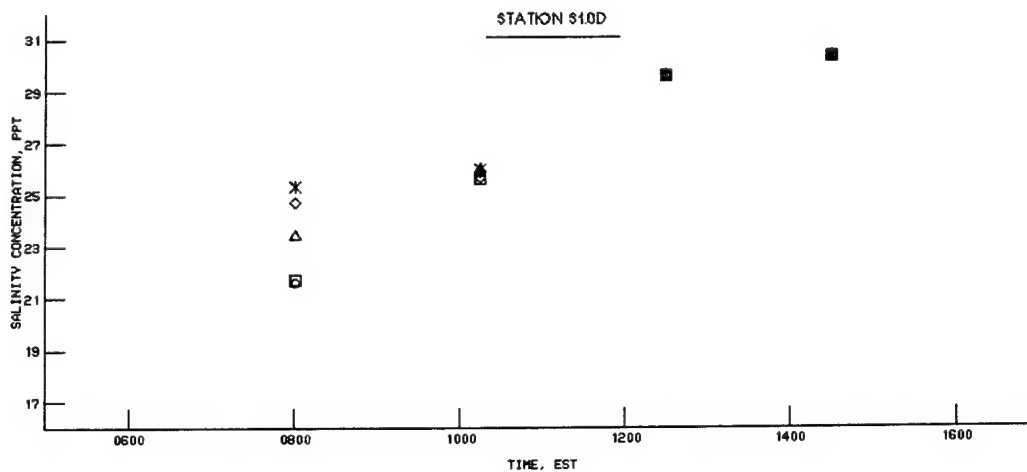
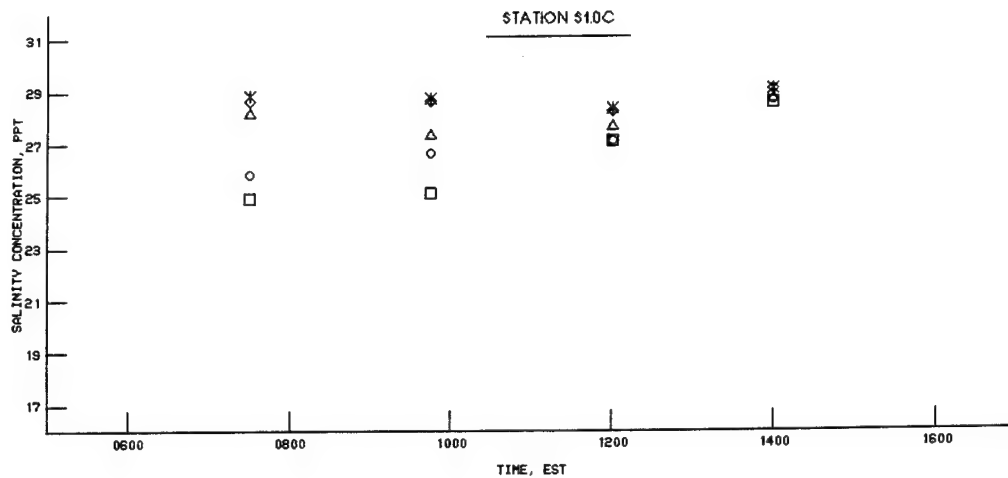
**SALINITY CONCENTRATION
STATIONS S1.0C AND S1.0D
04/28/93**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- ✱ - BOTTOM

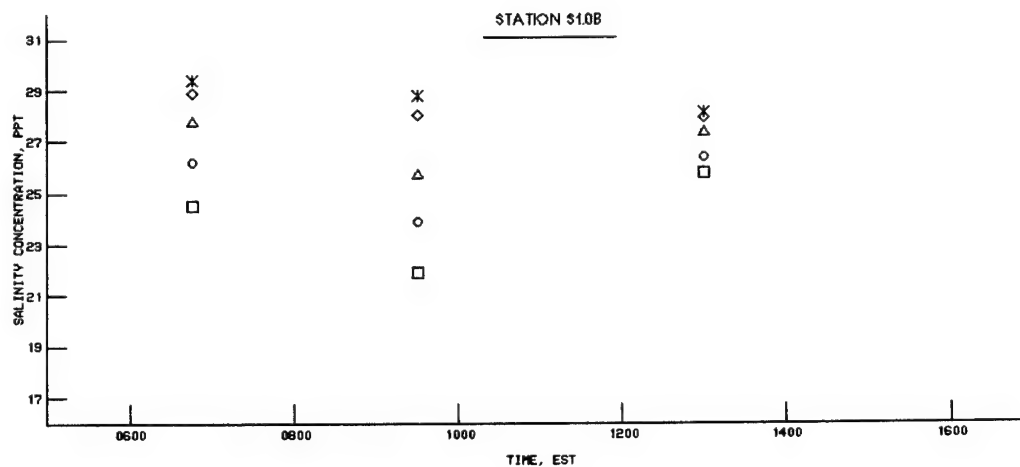
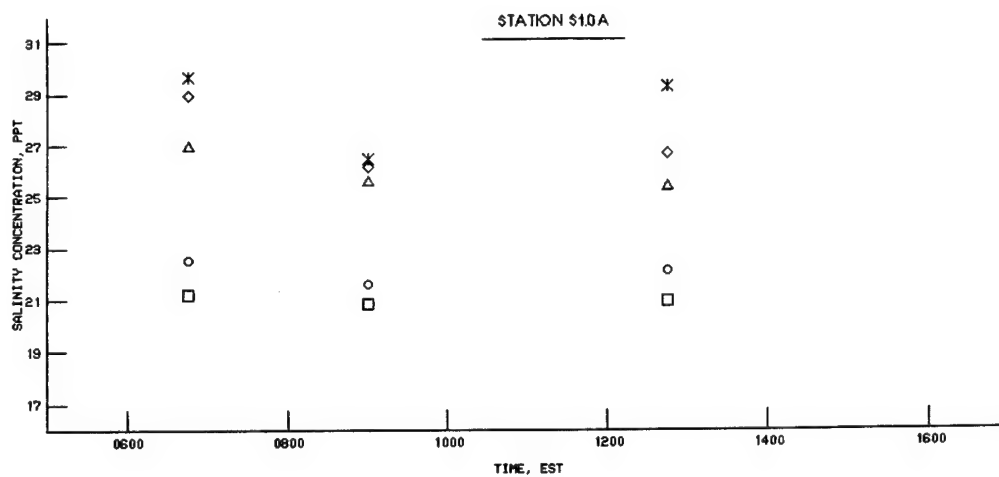
**SALINITY CONCENTRATION
STATIONS S1.0A AND S1.0B
04/29/93**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- × - BOTTOM

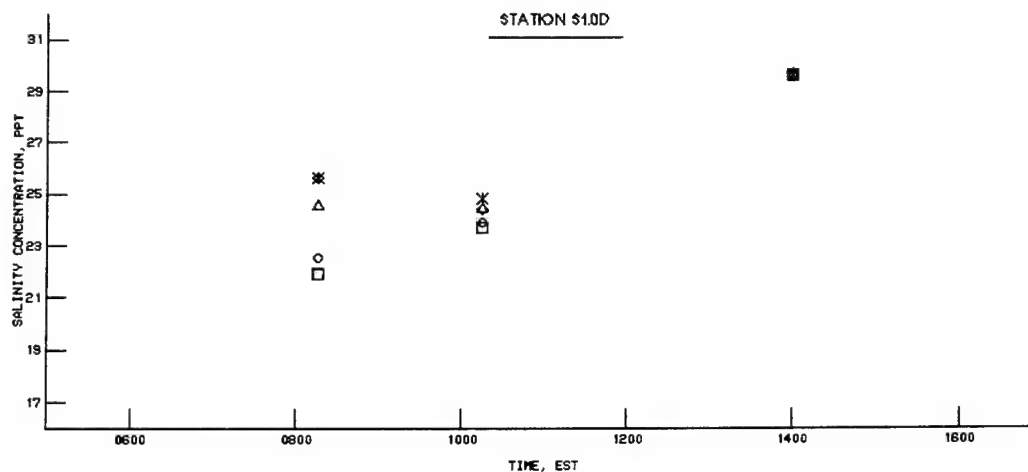
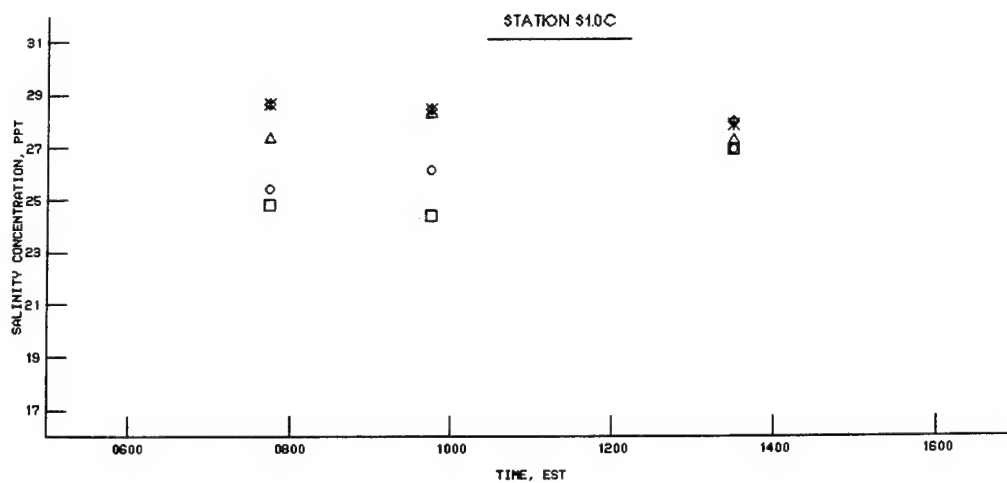
**SALINITY CONCENTRATION
STATIONS S1.0C AND S1.0D
04/29/93**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- × - BOTTOM

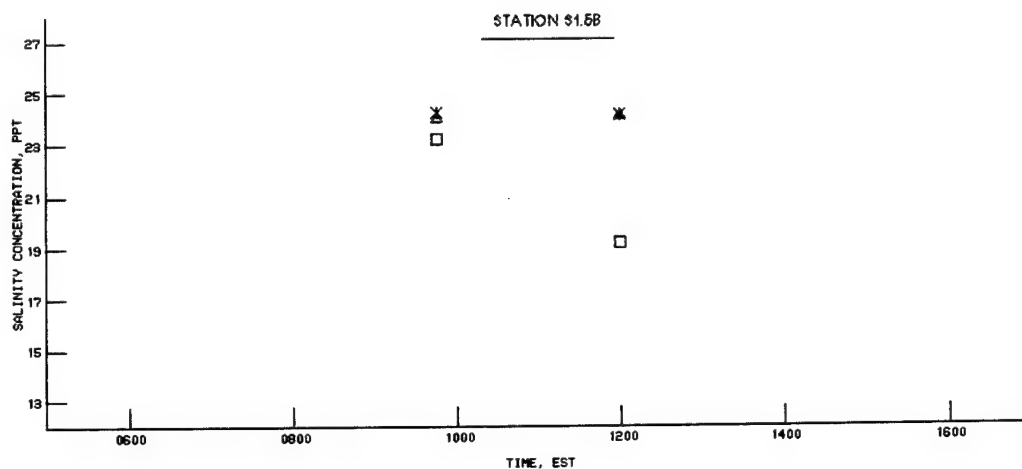
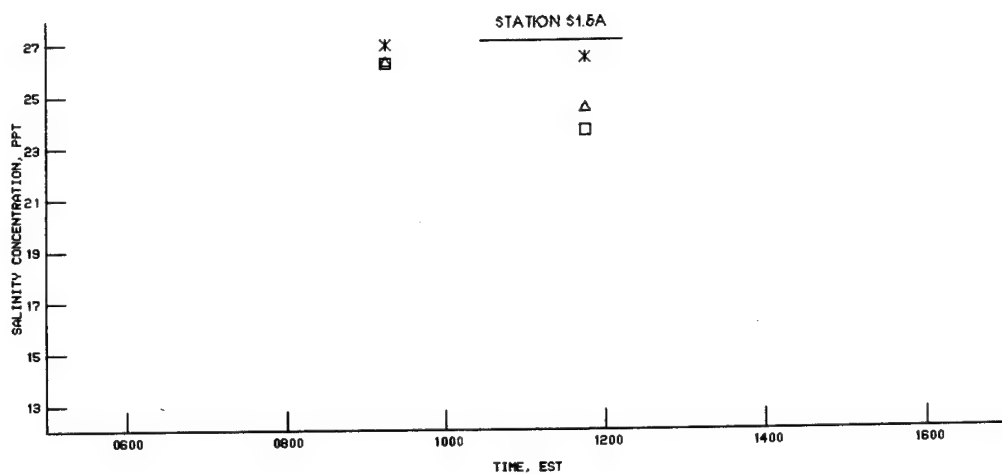
**SALINITY CONCENTRATION
STATIONS S1.0A AND S1.0B
04/30/93**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- X - BOTTOM

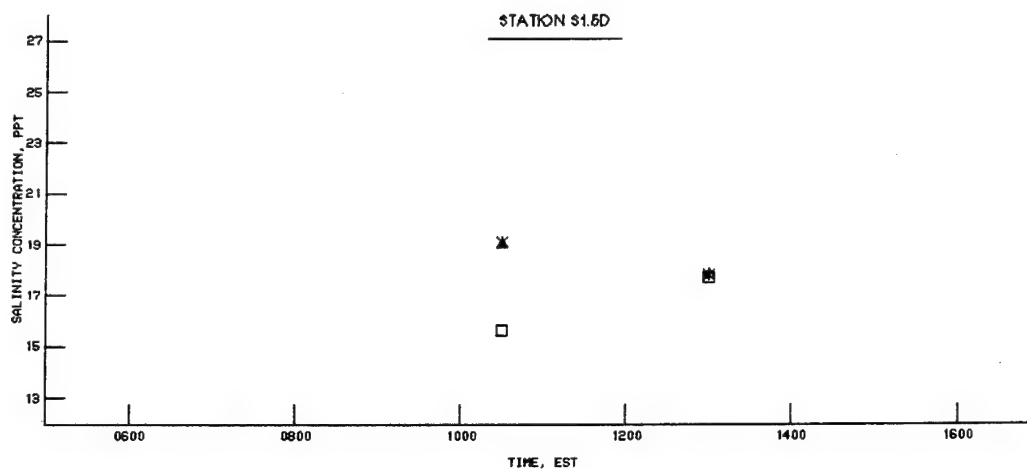
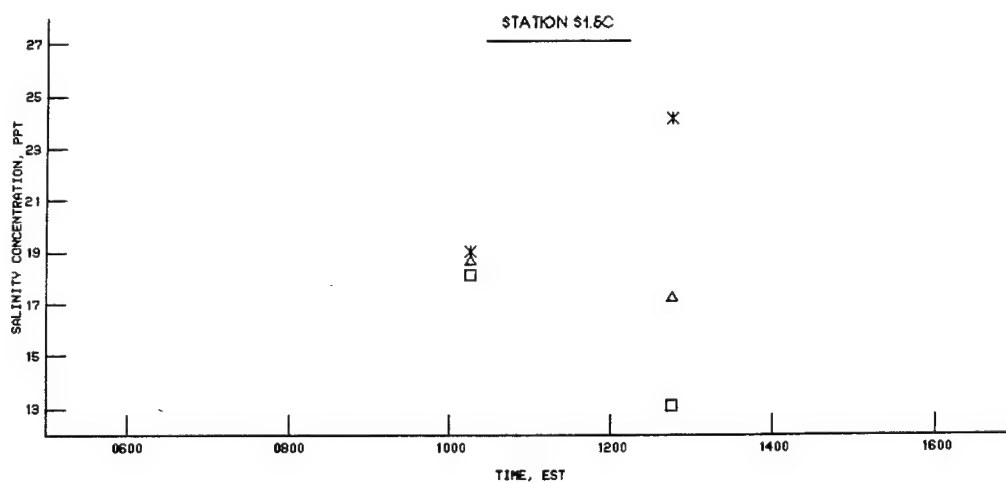
**SALINITY CONCENTRATION
STATIONS S1.0C AND S1.0D
04/30/93**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- ✕ - BOTTOM

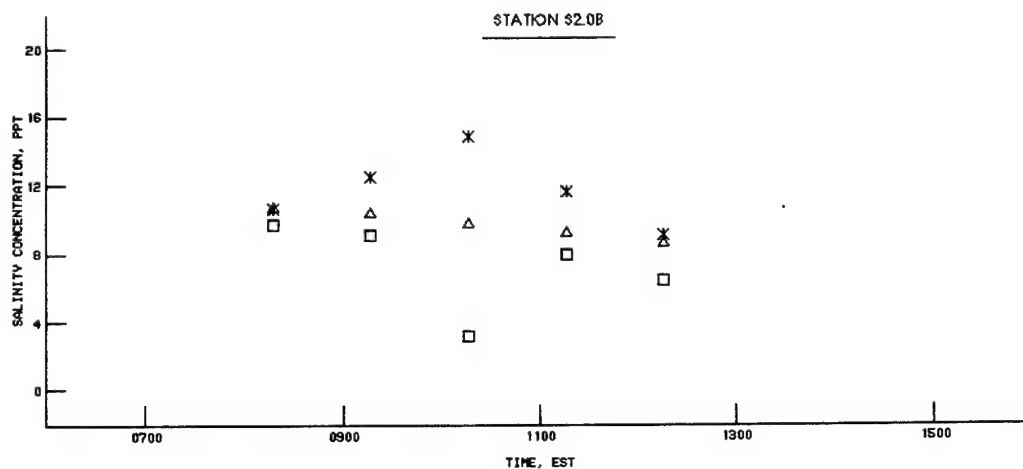
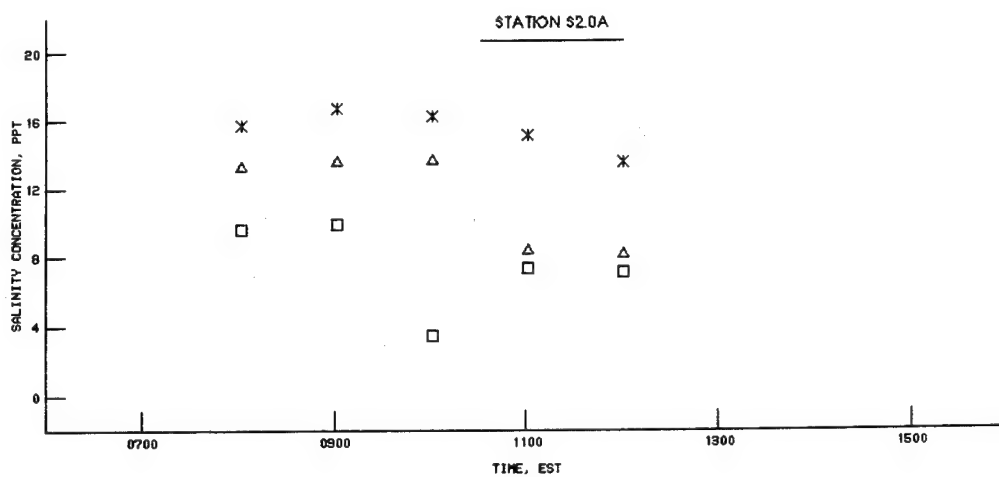
**SALINITY CONCENTRATION
STATIONS S1.5A AND S1.5B
04/19/93**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- ✕ - BOTTOM

**SALINITY CONCENTRATION
STATIONS S1.5C AND S1.5D
04/19/93**



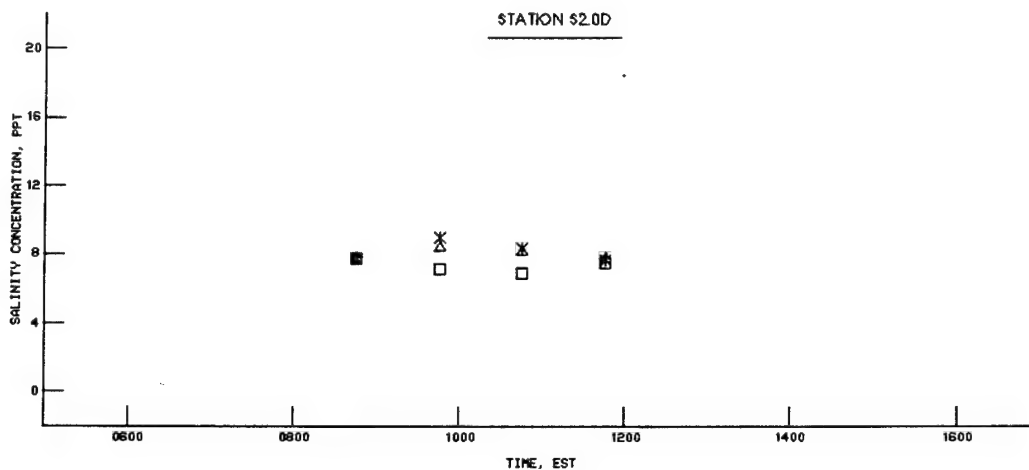
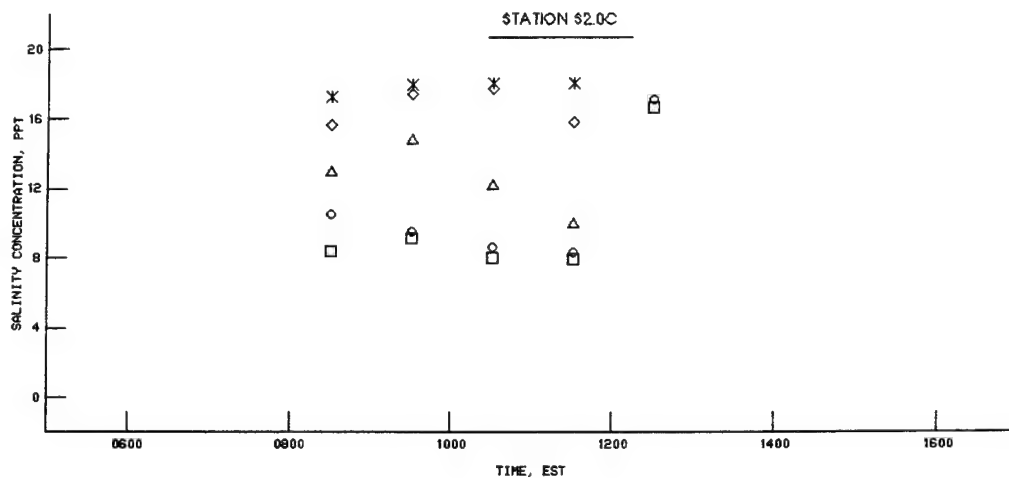
LEGEND

□ - SURFACE

△ - MIDDEPTH

* - BOTTOM

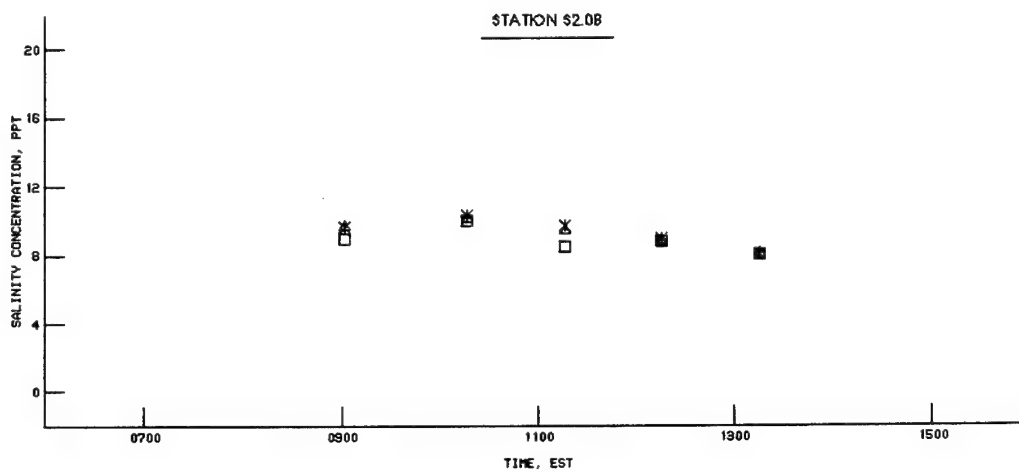
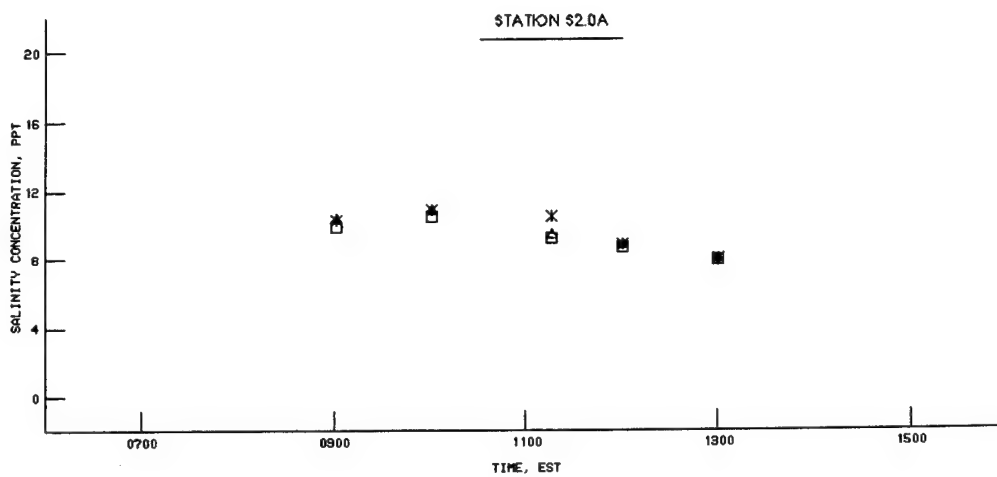
**SALINITY CONCENTRATION
STATIONS S2.0A AND S2.0B
04/19/93**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- X - BOTTOM

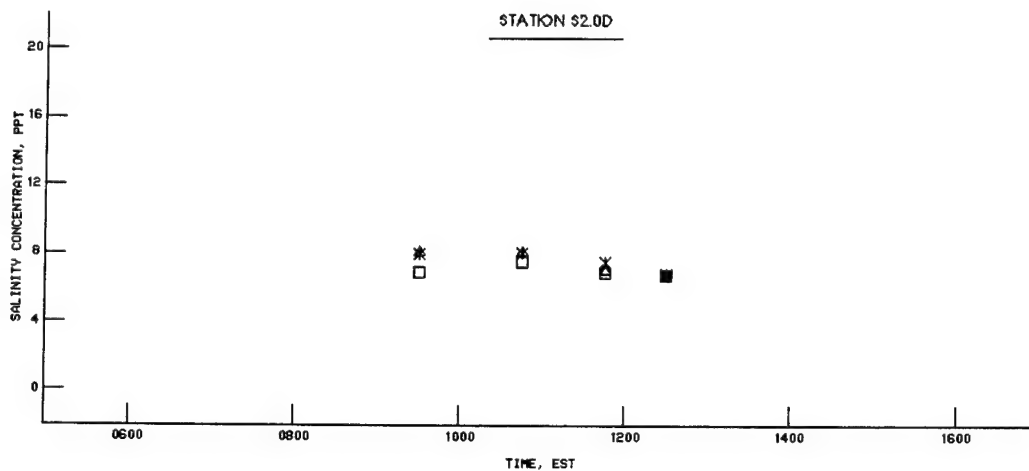
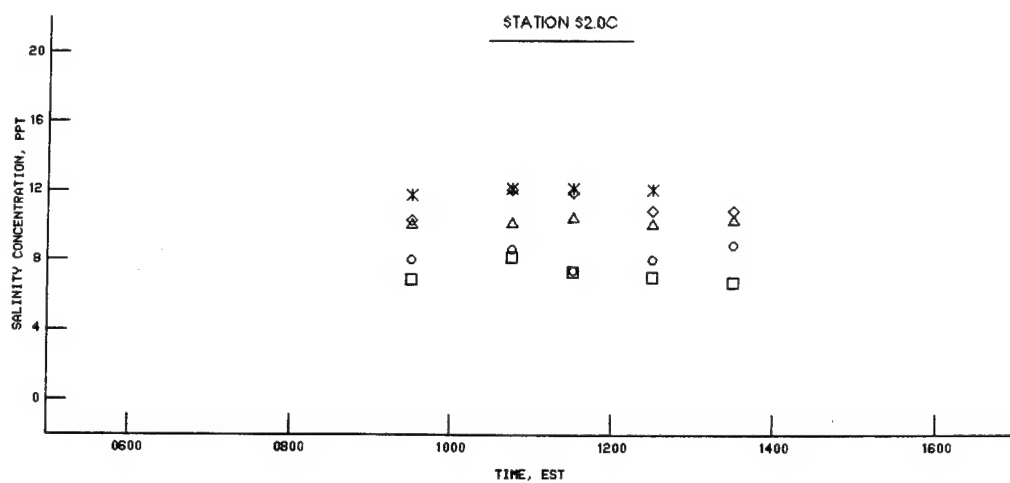
**SALINITY CONCENTRATION
STATIONS S2.0C AND S2.0D
04/19/93**



LEGEND

- - SURFACE
- △ - MIDDEPTH
- * - BOTTOM

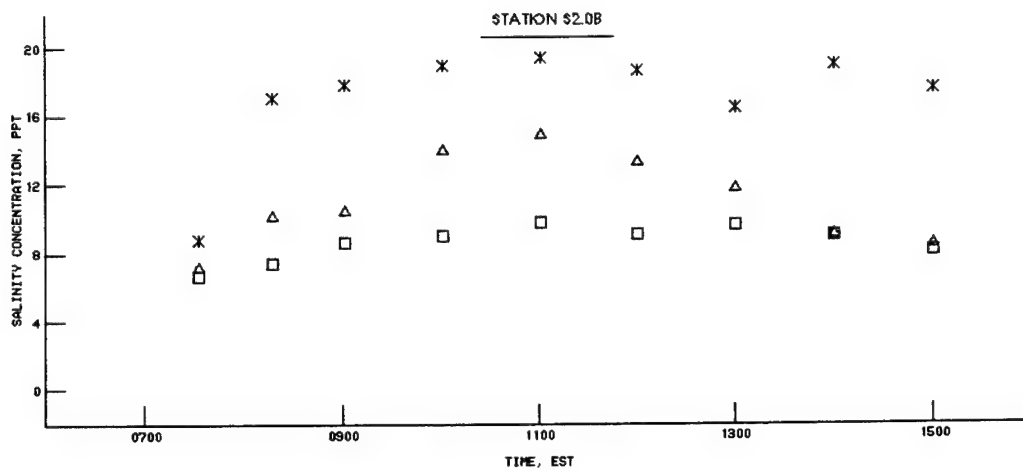
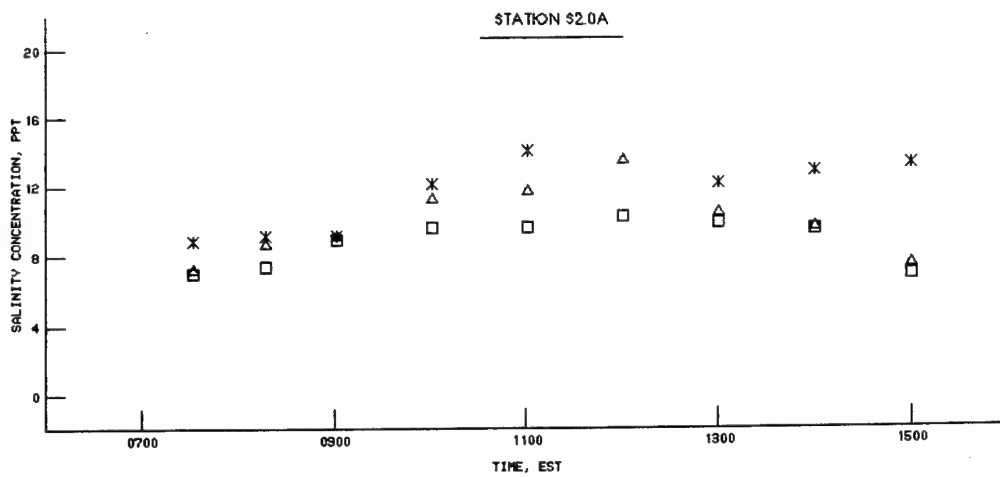
**SALINITY CONCENTRATION
STATIONS S2.0A AND S2.0B
04/21/93**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- ✱ - BOTTOM

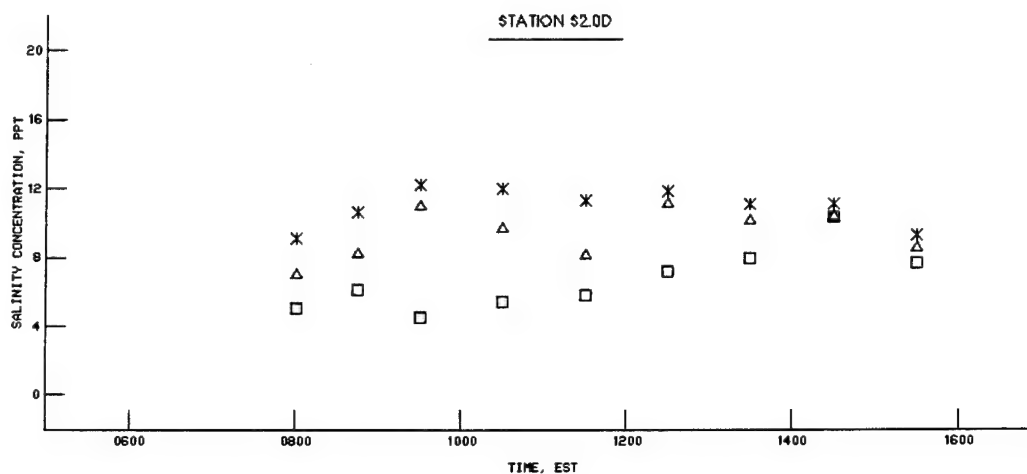
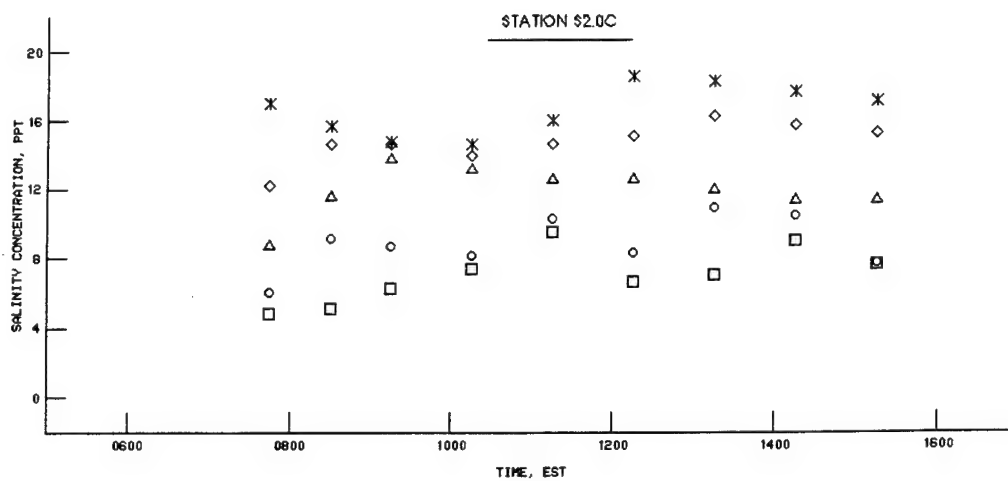
**SALINITY CONCENTRATION
STATIONS S2.0C AND S2.0D
04/21/93**



LEGEND

- - SURFACE
- △ - MIDDEPTH
- × - BOTTOM

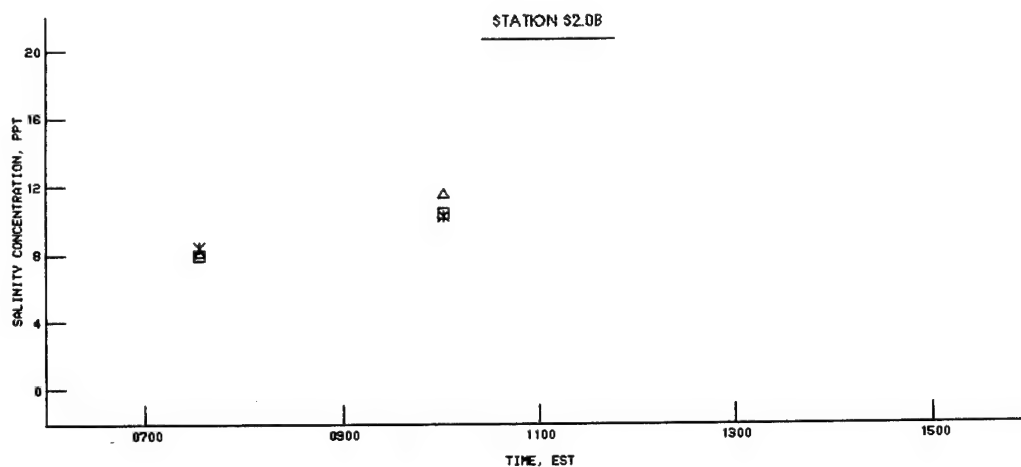
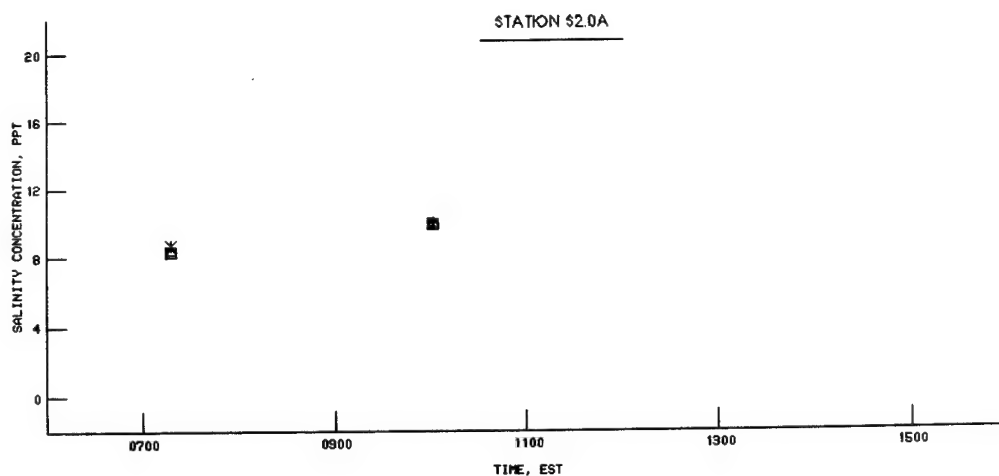
**SALINITY CONCENTRATION
STATIONS S2.0A AND S2.0B
04/24/93**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- ✱ - BOTTOM

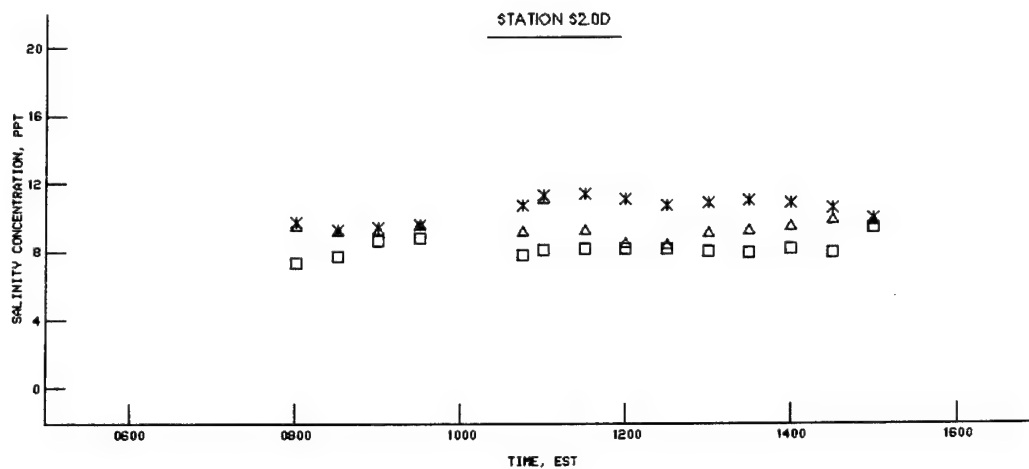
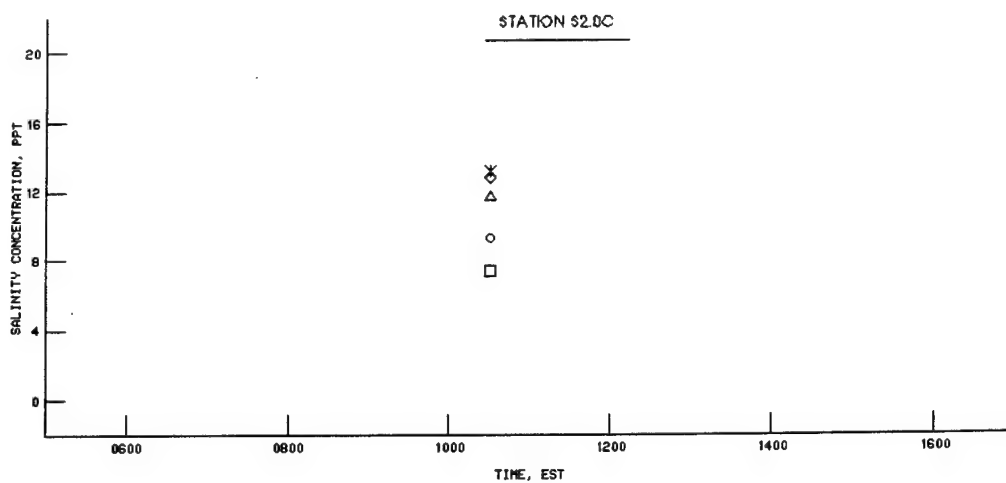
**SALINITY CONCENTRATION
STATIONS S2.0C AND S2.0D
04/24/93**



LEGEND

- - SURFACE
- △ - MIDDEPTH
- * - BOTTOM

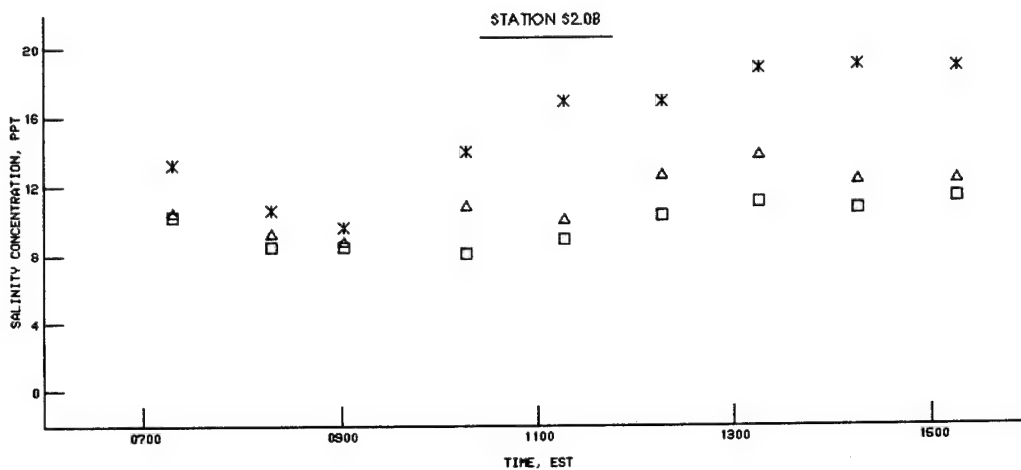
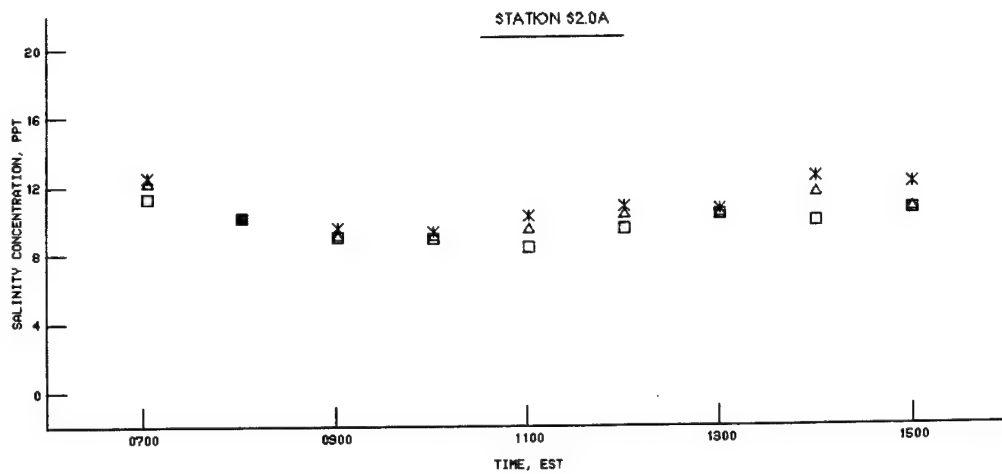
SALINITY CONCENTRATION
STATIONS S2.0A AND S2.0B
04/25/93



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- × - BOTTOM

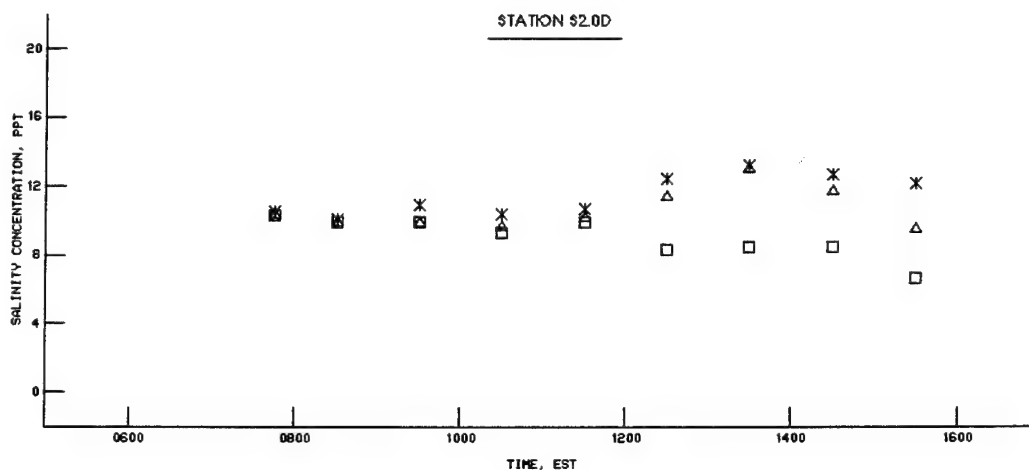
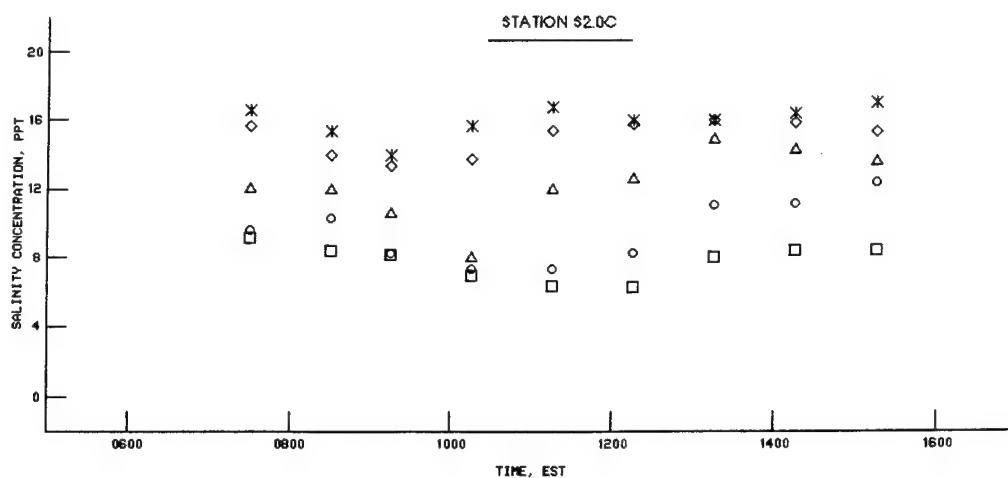
**SALINITY CONCENTRATION
STATIONS S2.0C AND S2.0D
04/25/93**



LEGEND

- - SURFACE
- △ - MIDDEPTH
- × - BOTTOM

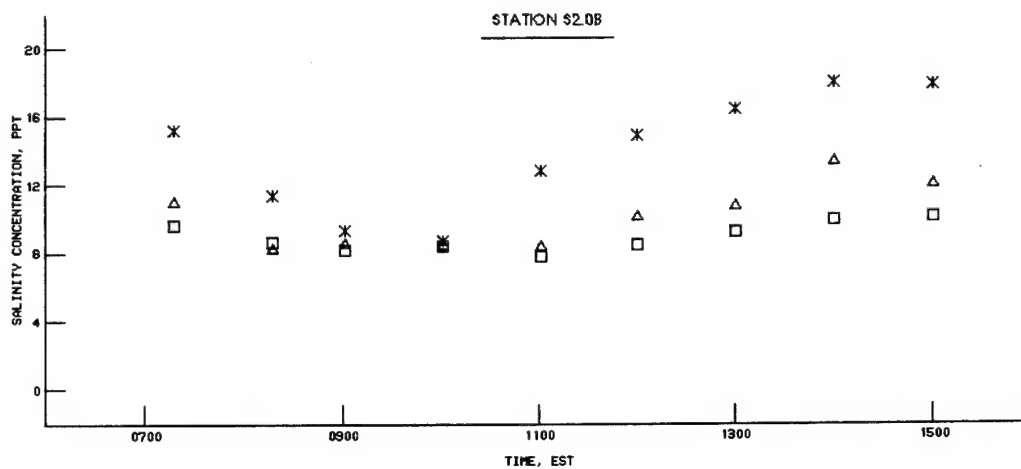
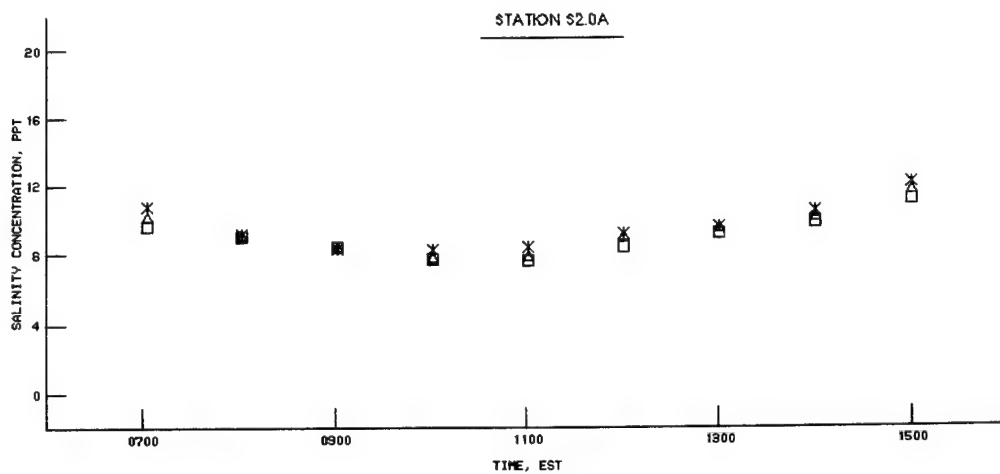
**SALINITY CONCENTRATION
STATIONS S2.0A AND S2.0B
04/28/93**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- ✱ - BOTTOM

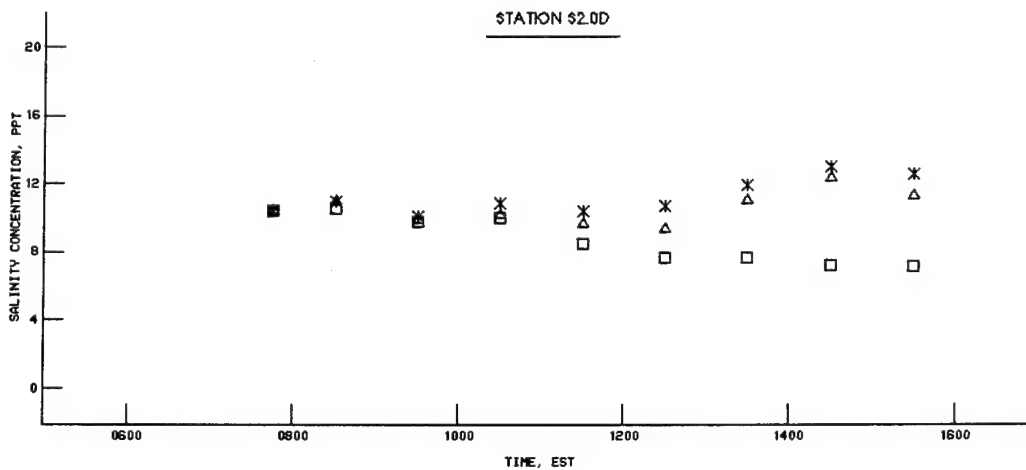
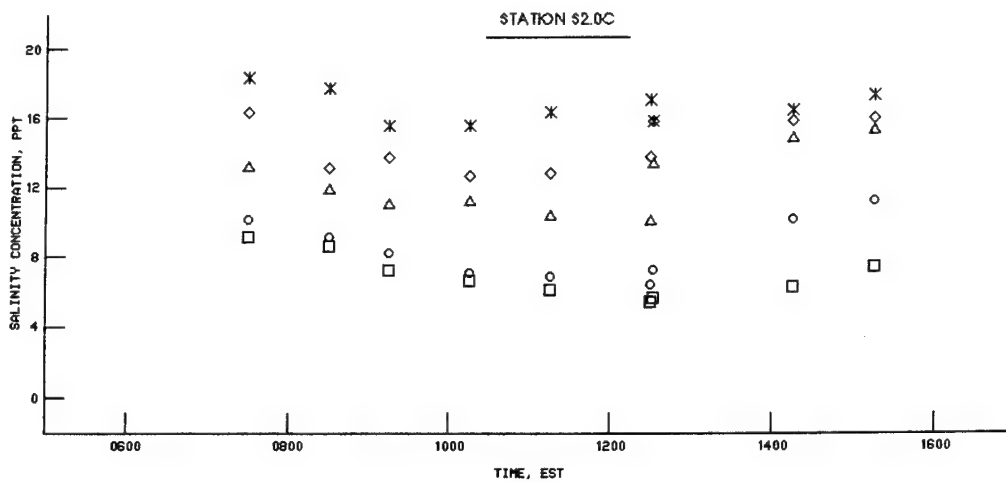
**SALINITY CONCENTRATION
STATIONS S2.0C AND S2.0D
04/28/93**



LEGEND

- - SURFACE
- △ - MIDDEPTH
- × - BOTTOM

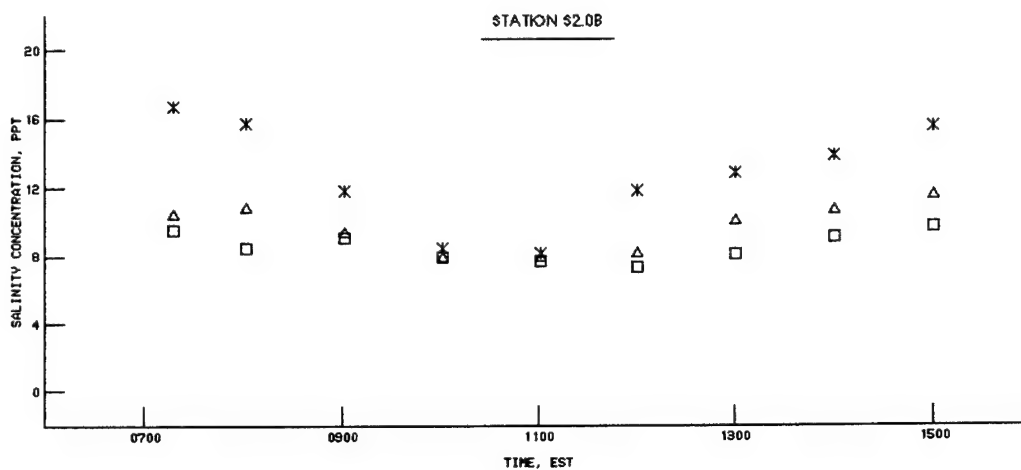
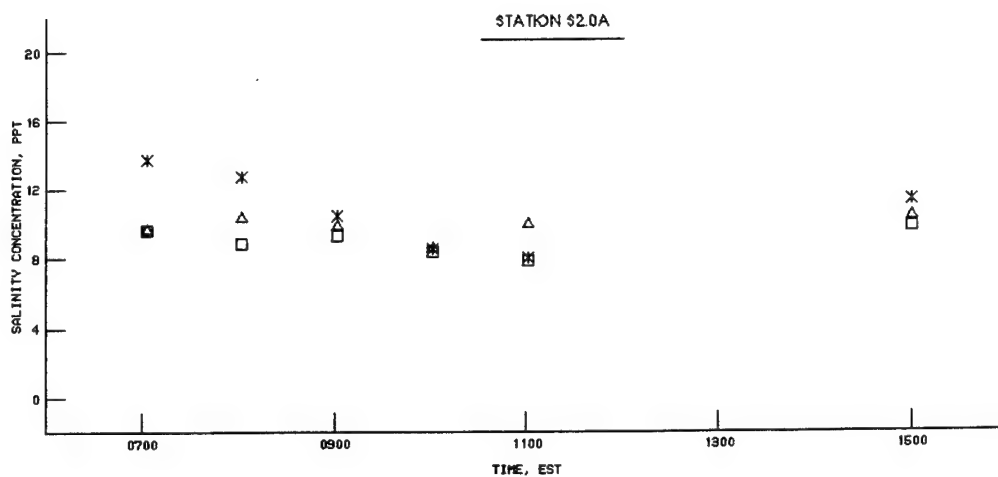
**SALINITY CONCENTRATION
STATIONS S2.0A AND S2.0B
04/29/93**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- * - BOTTOM

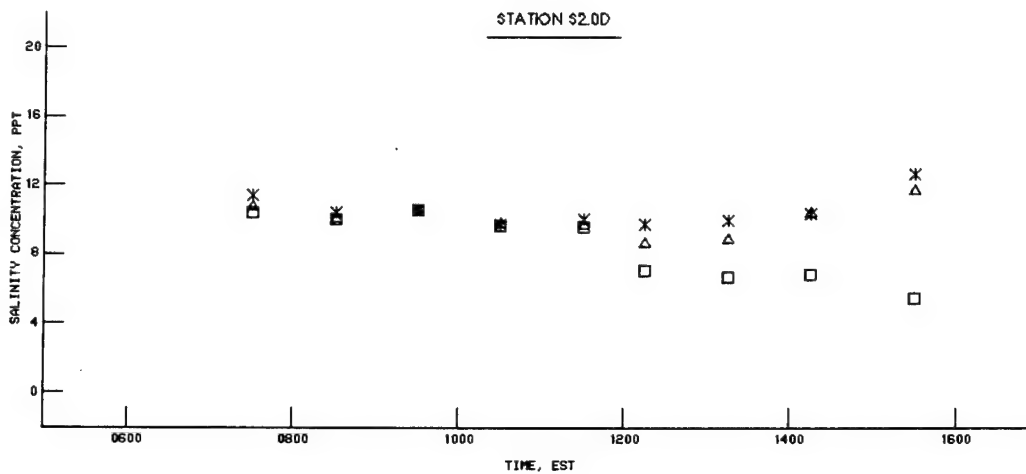
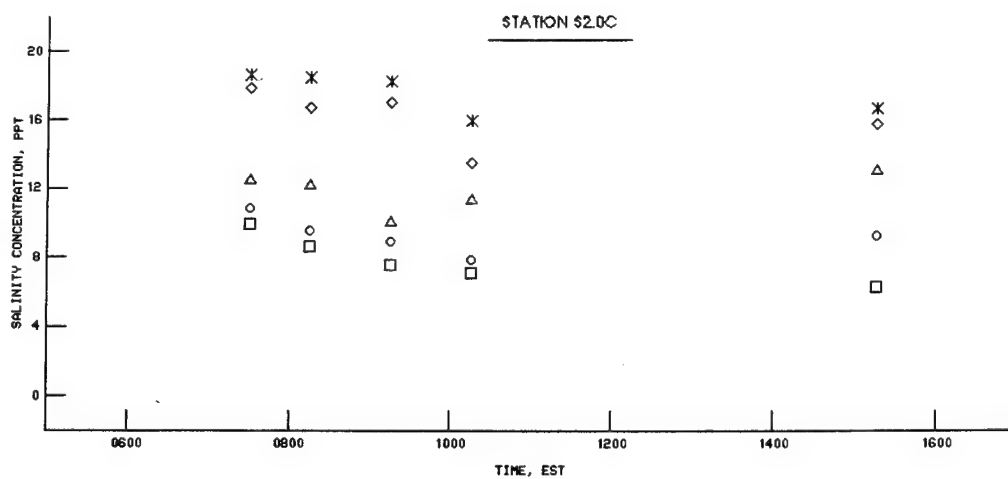
**SALINITY CONCENTRATION
STATIONS S2.0C AND 2.0D
04/29/93**



LEGEND

- - SURFACE
- △ - MIDDEPTH
- * - BOTTOM

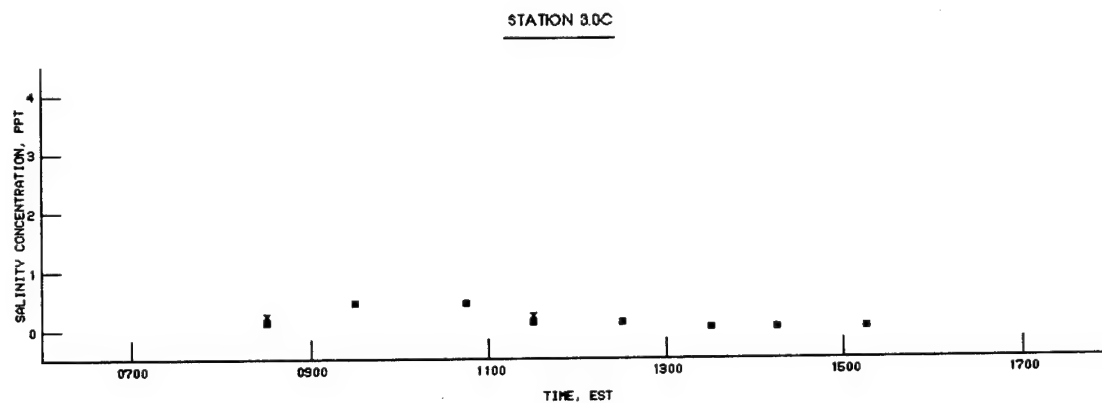
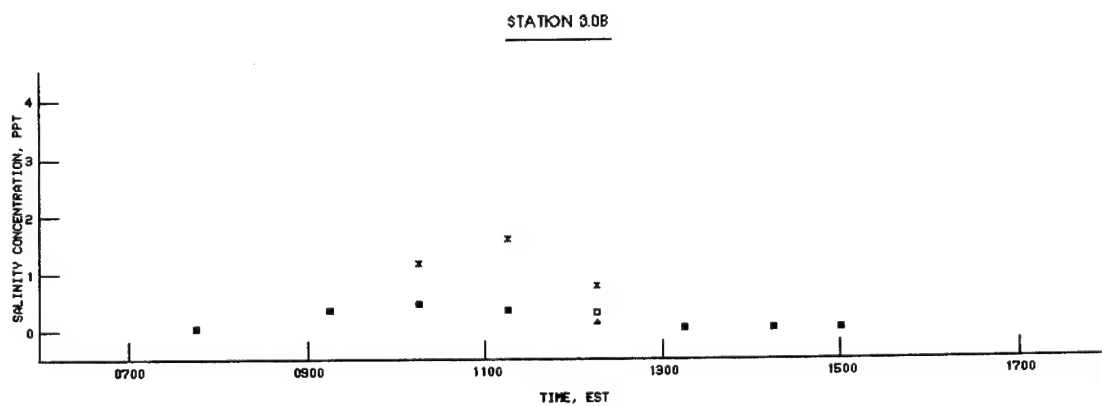
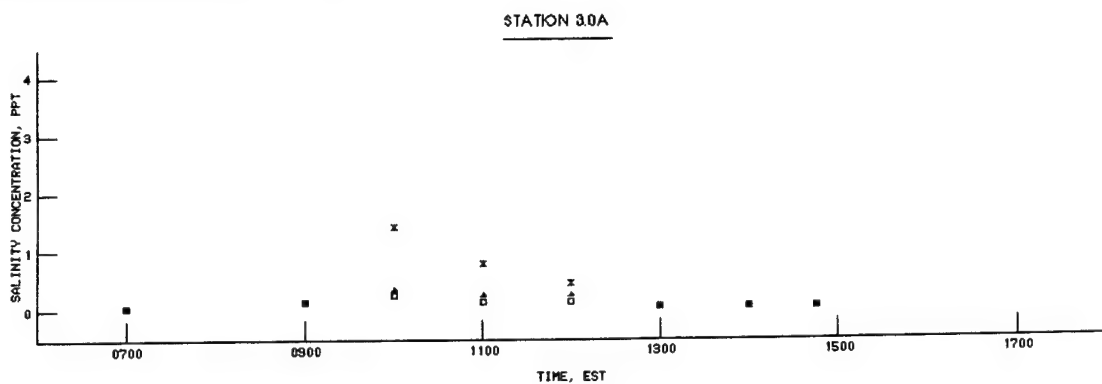
**SALINITY CONCENTRATION
STATIONS S2.0A AND S2.0B
04/30/93**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- * - BOTTOM

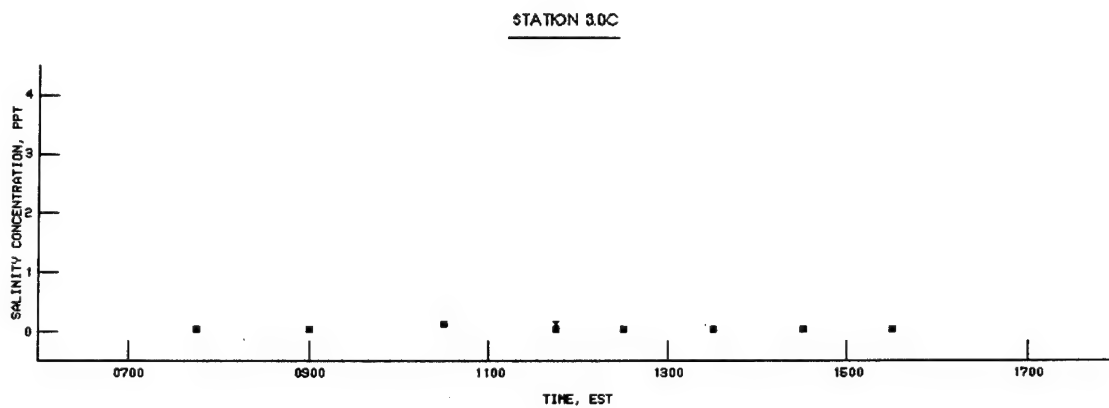
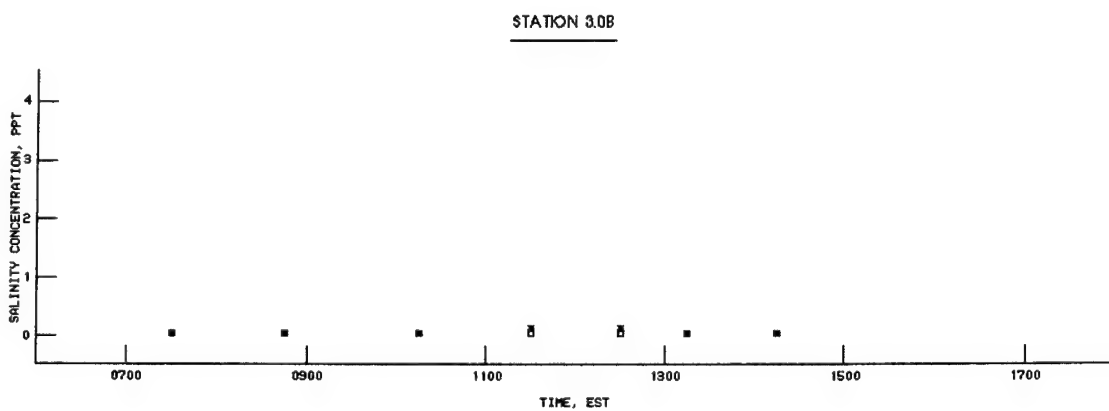
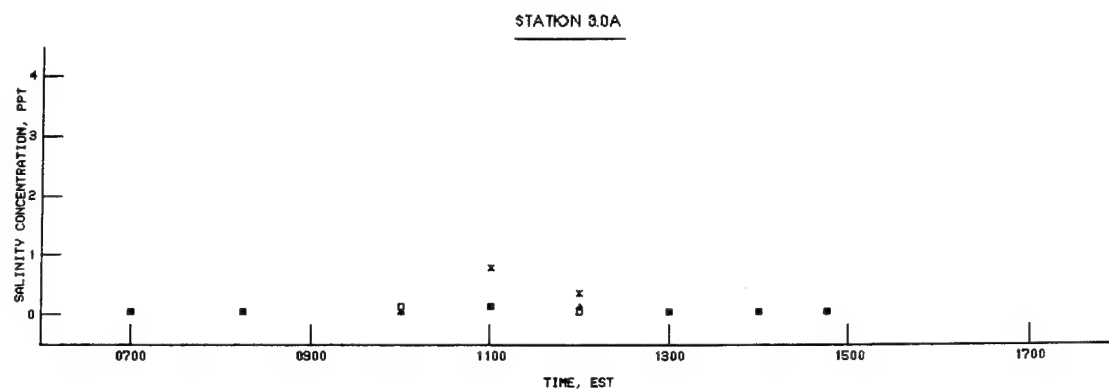
**SALINITY CONCENTRATION
STATIONS S2.0C AND S2.0D
04/30/93**



LEGEND

| | |
|---|------------|
| □ | - SURFACE |
| △ | - MIDDEPTH |
| × | - BOTTOM |

**SALINITY CONCENTRATION
STATIONS S3.0A, S3.0B, AND S3.0C
04/19/93**

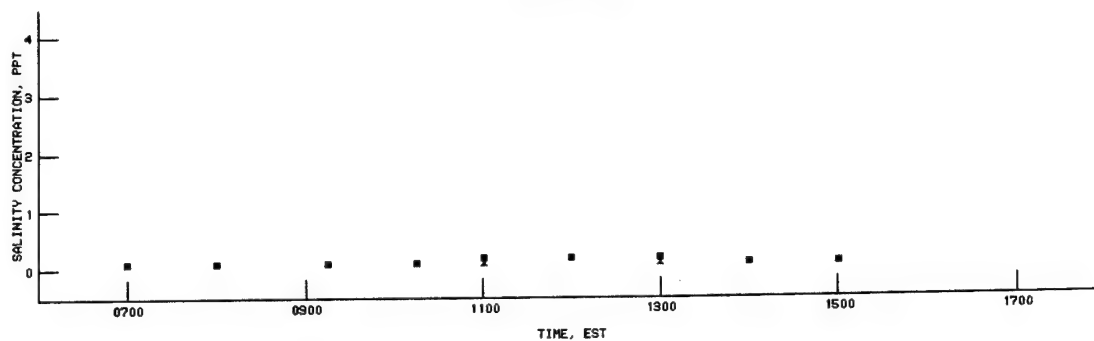


LEGEND

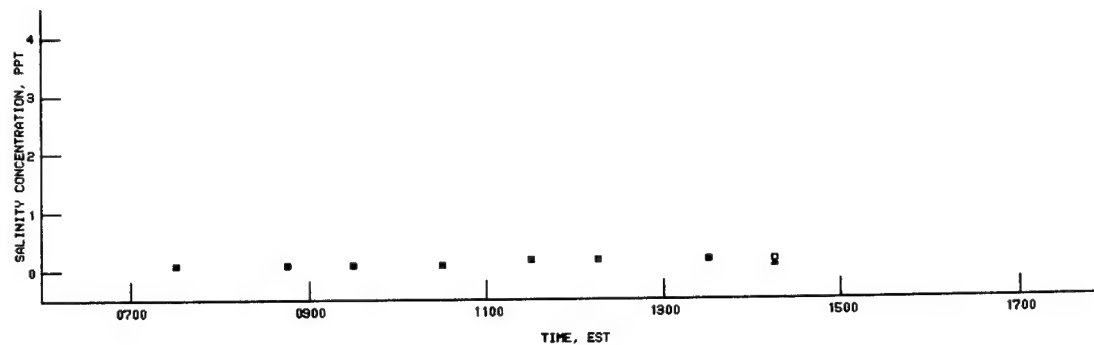
□ - SURFACE
 △ - MIDDEPTH
 * - BOTTOM

SALINITY CONCENTRATION
STATIONS S3.0A, S3.0B, AND S3.0C
04/20/93

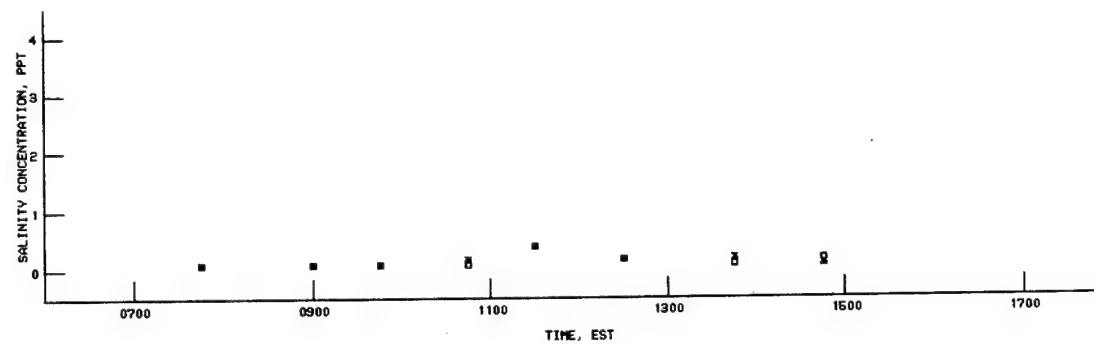
STATION 3.0A



STATION 3.0B



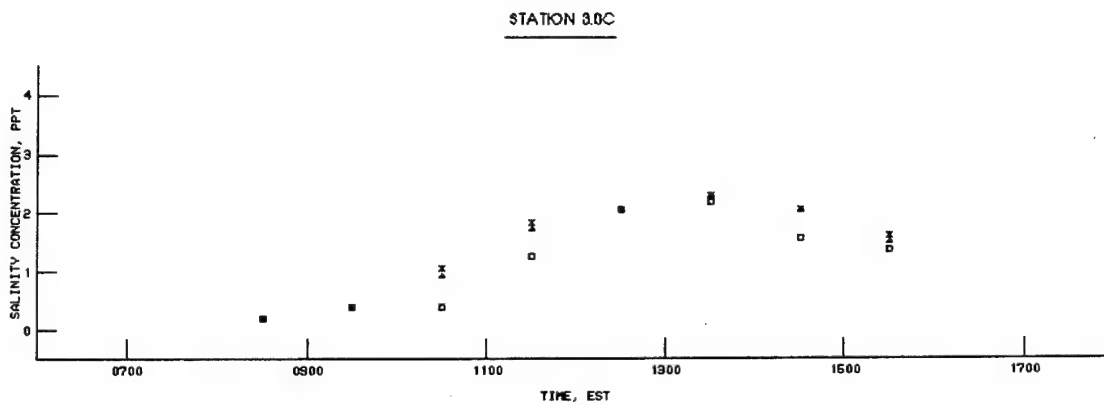
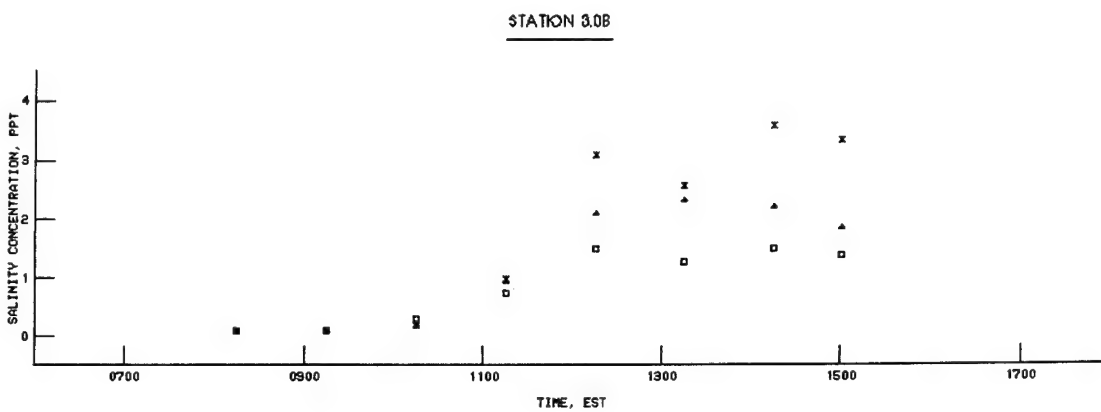
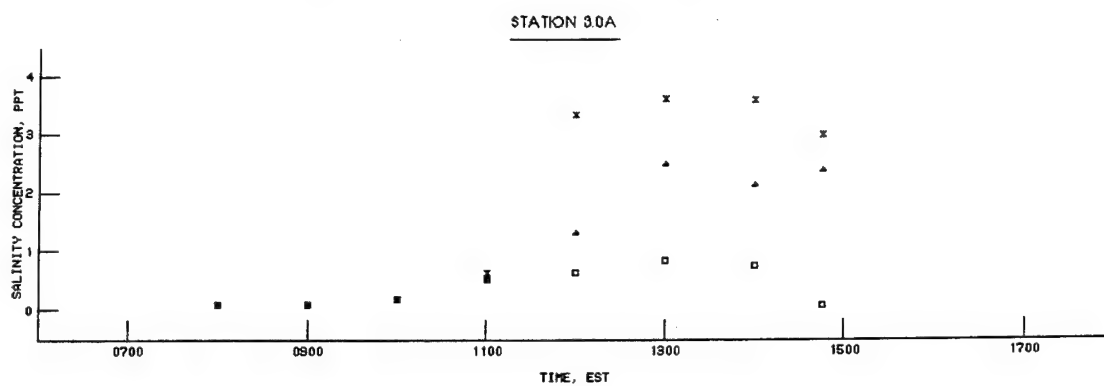
STATION 3.0C



LEGEND

- - SURFACE
- △ - MIDDEPTH
- ✱ - BOTTOM

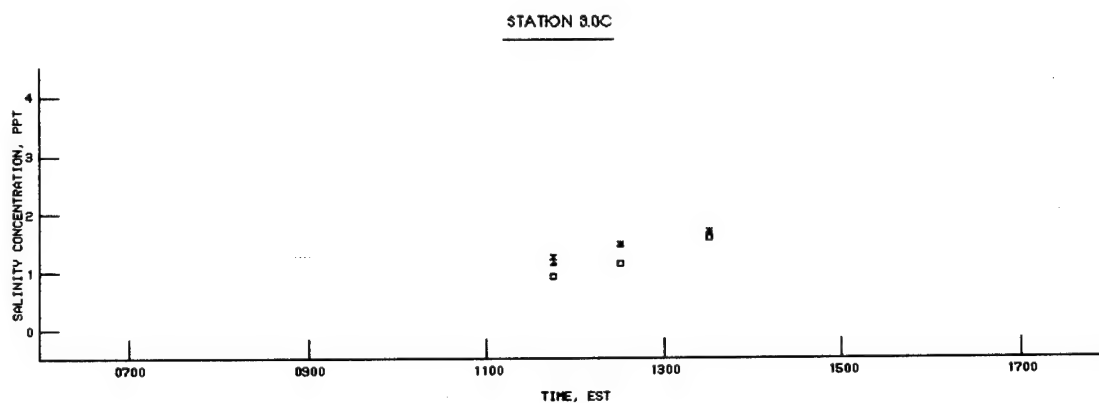
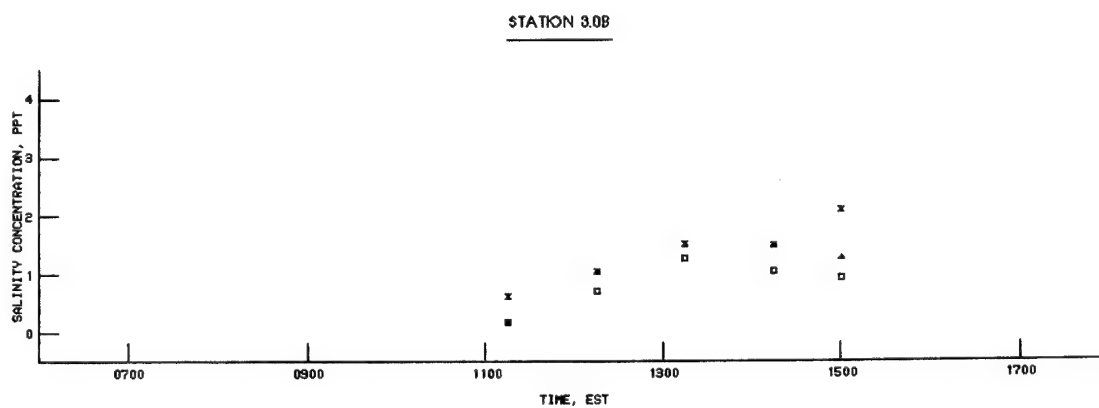
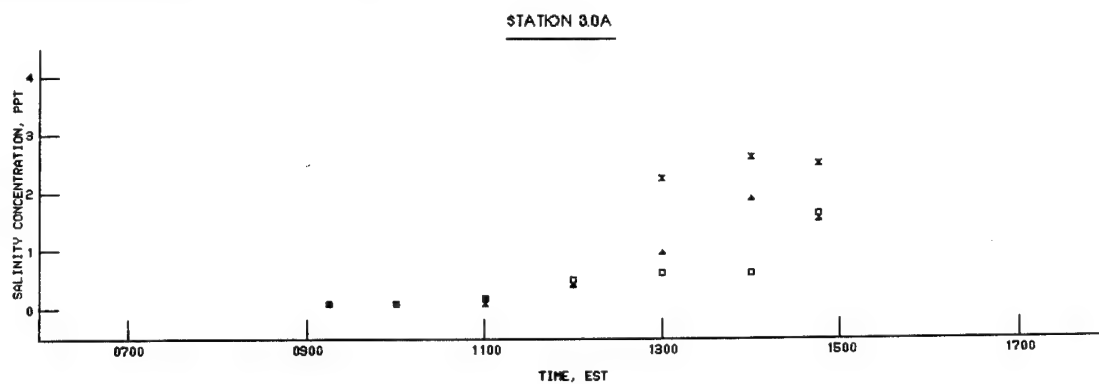
**SALINITY CONCENTRATION
STATIONS S3.0A, S3.0B, AND S3.0C
04/22/93**



LEGEND

□ - SURFACE
 △ - MIDDEPTH
 ✕ - BOTTOM

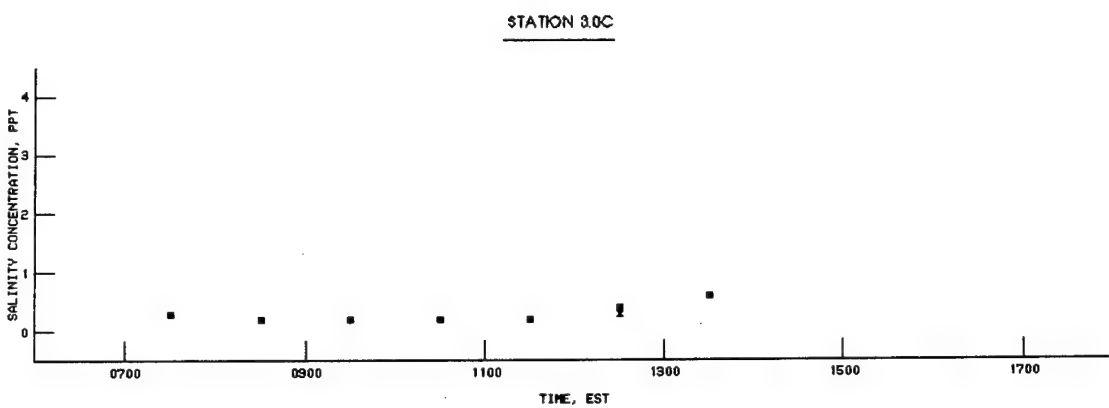
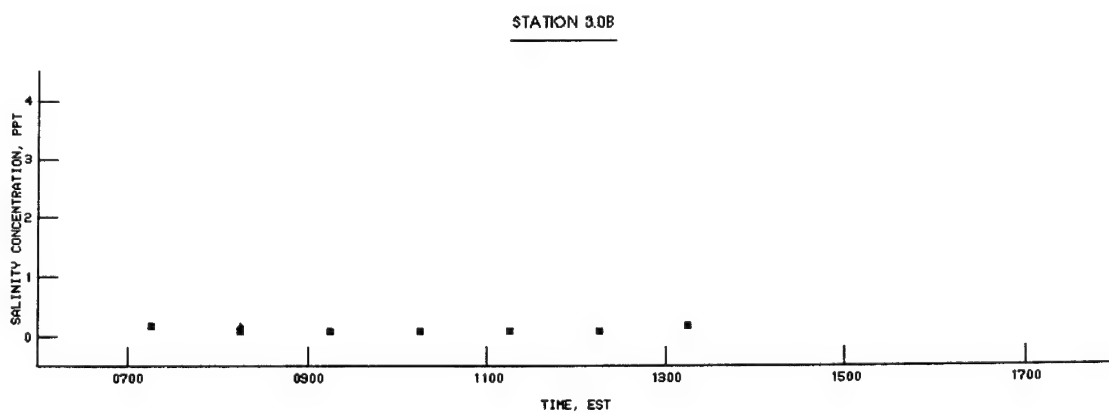
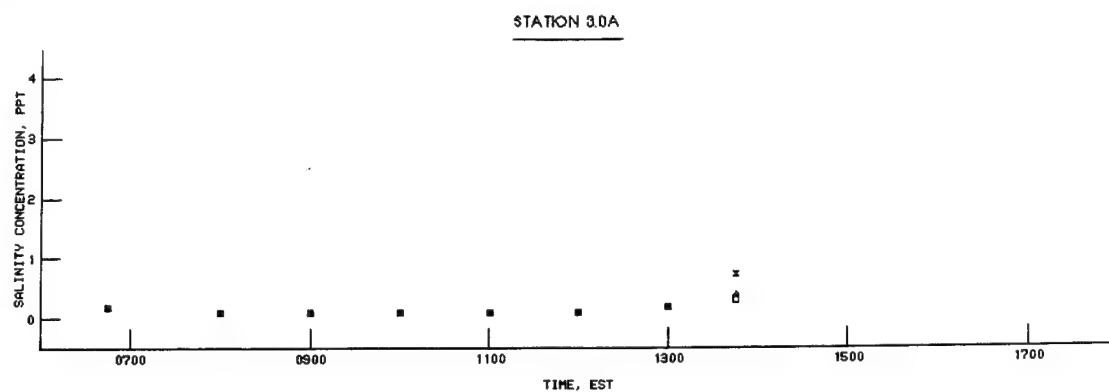
**SALINITY CONCENTRATION
 STATIONS S3.0A, S3.0B, AND S3.0C
 04/24/93**



LEGEND

□ - SURFACE
 △ - MIDDEPTH
 ✕ - BOTTOM

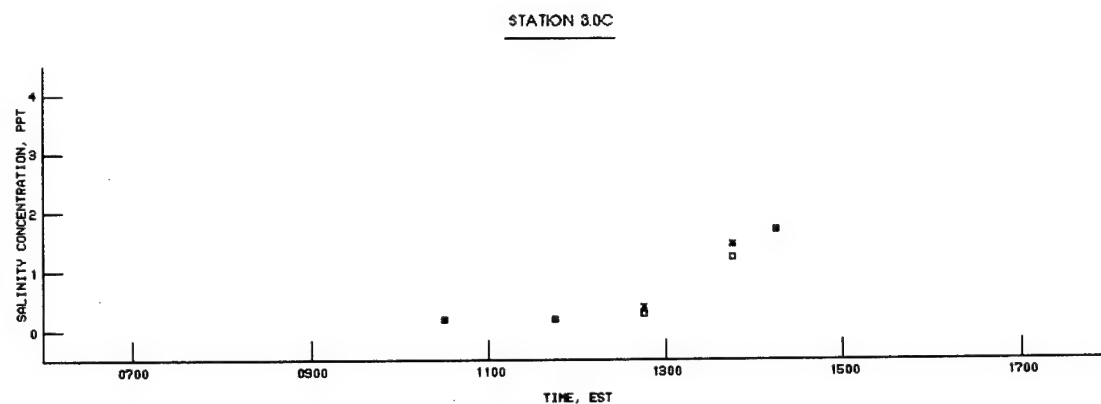
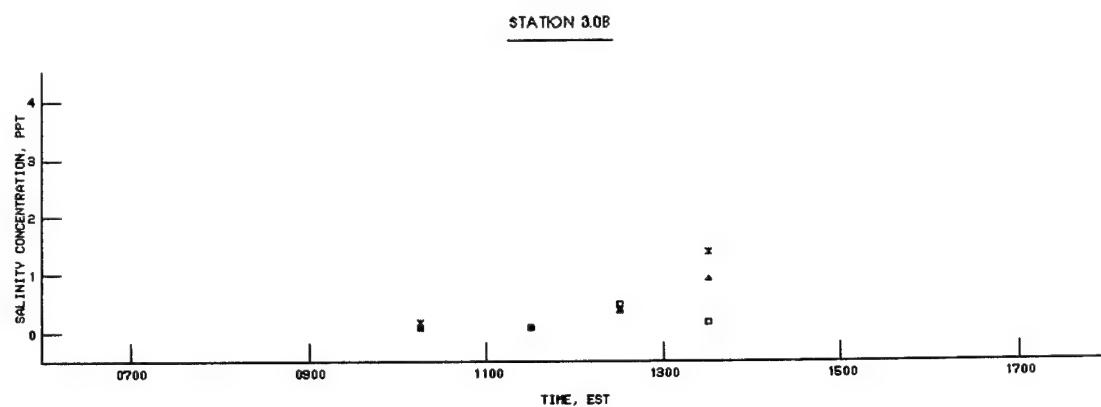
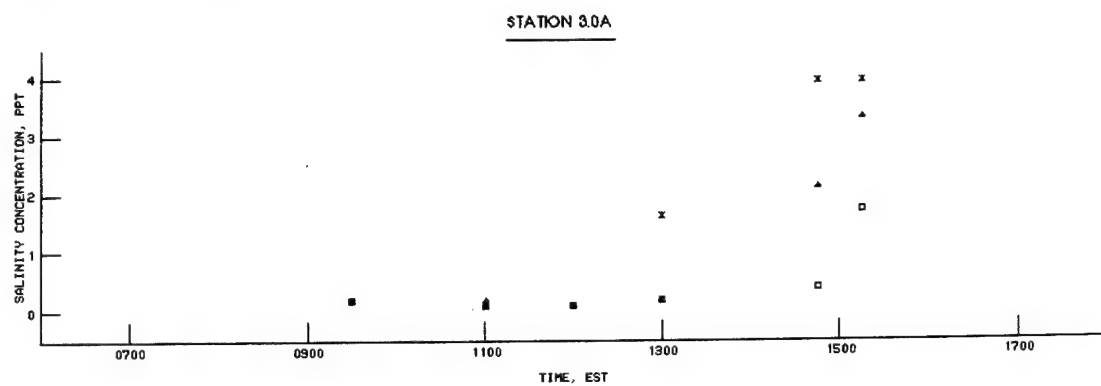
**SALINITY CONCENTRATION
 STATIONS S3.0A, S3.0B, AND S3.0C
 04/25/93**



LEGEND

□ - SURFACE
 △ - MIDDEPTH
 * - BOTTOM

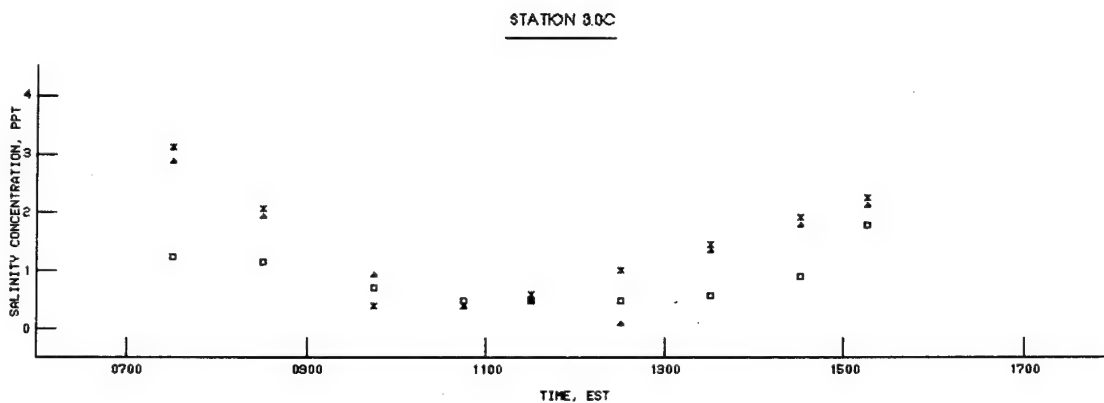
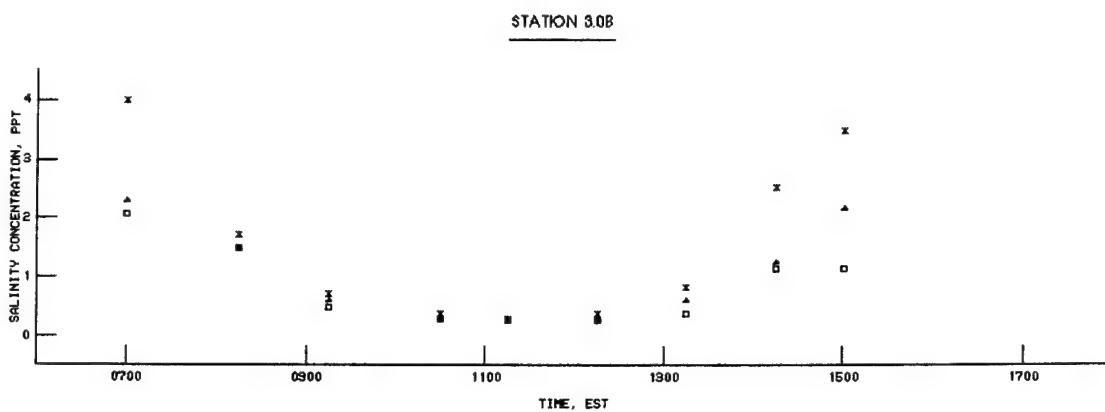
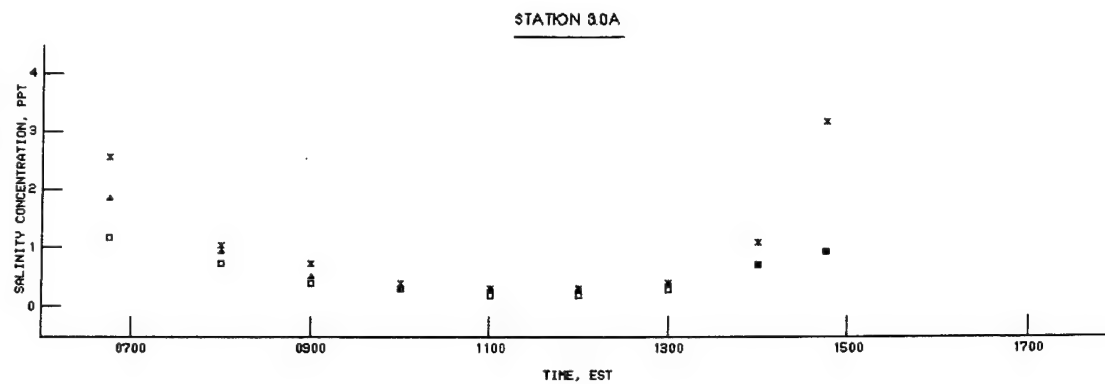
**SALINITY CONCENTRATION
 STATIONS S3.0A, S3.0B, AND S3.0C
 04/26/93**



LEGEND

| | |
|---|------------|
| □ | - SURFACE |
| △ | - MIDDEPTH |
| ✱ | - BOTTOM |

**SALINITY CONCENTRATION
STATIONS S3.0A, S3.0B, AND S3.0C
04/27/93**

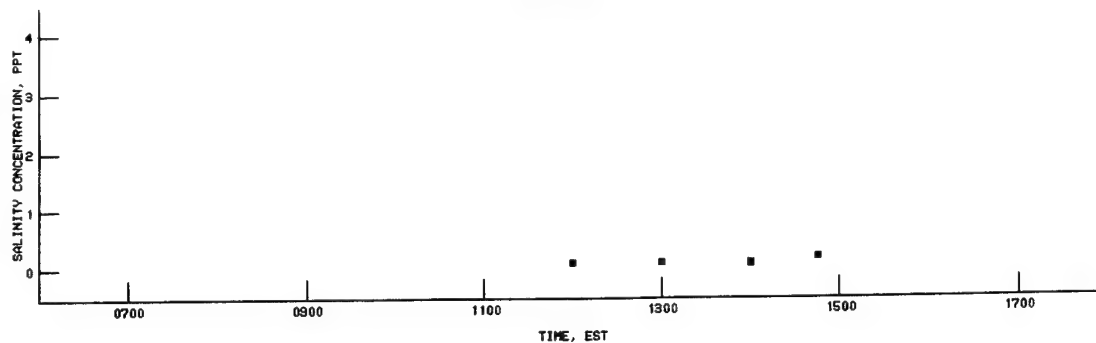


LEGEND

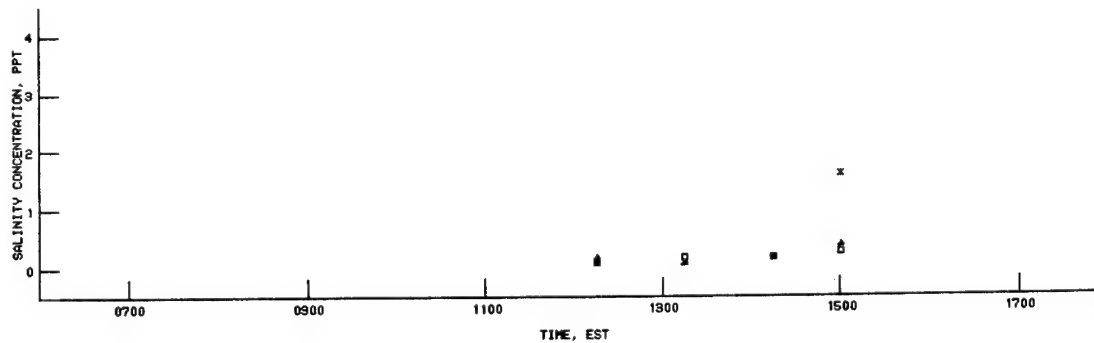
□ - SURFACE
 △ - MIDDEPTH
 ✕ - BOTTOM

**SALINITY CONCENTRATION
 STATIONS S3.0A, S3.0B, AND S3.0C
 04/28/93**

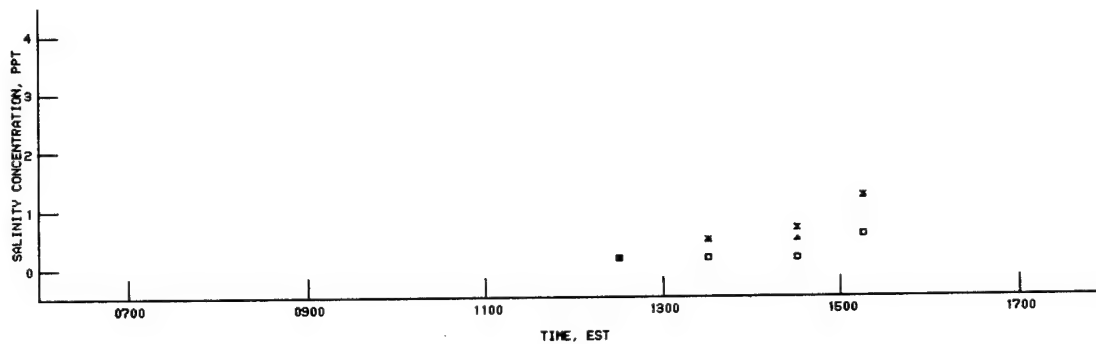
STATION 3.0A



STATION 3.0B



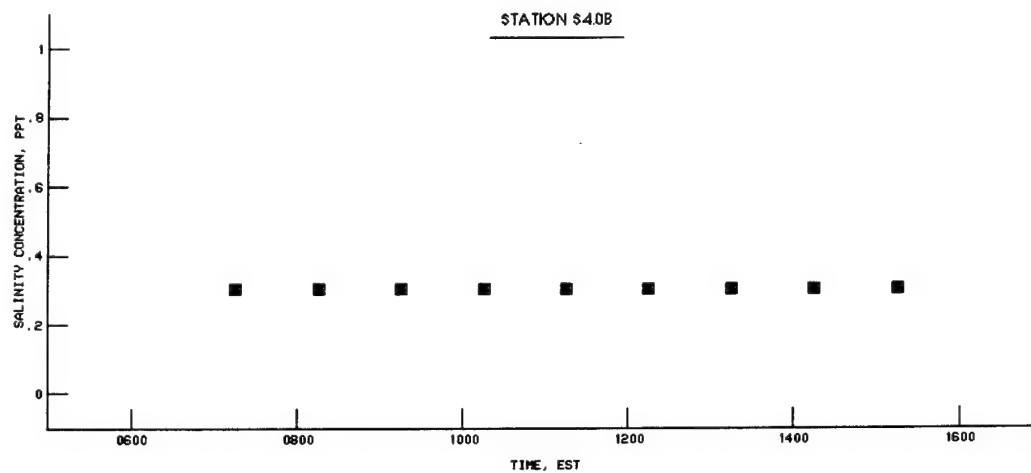
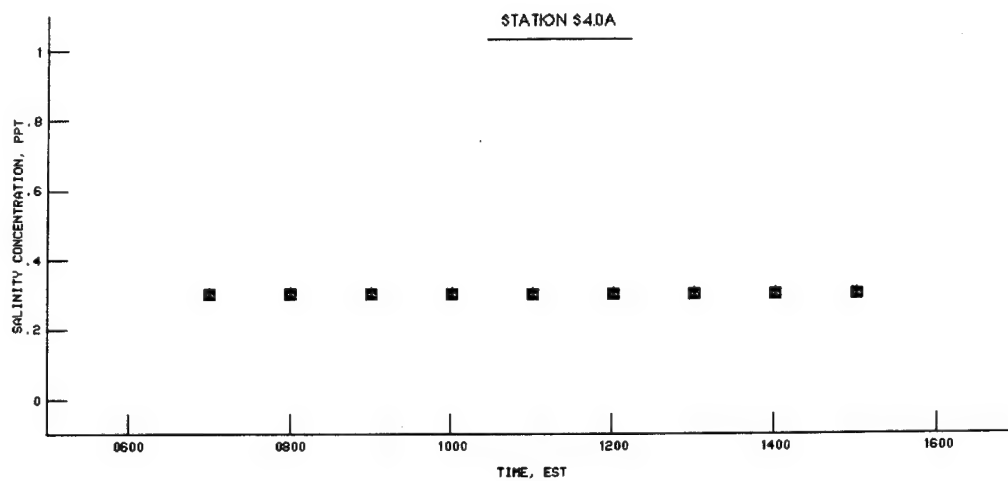
STATION 3.0C



LEGEND

- - SURFACE
- △ - MIDDEPTH
- ✕ - BOTTOM

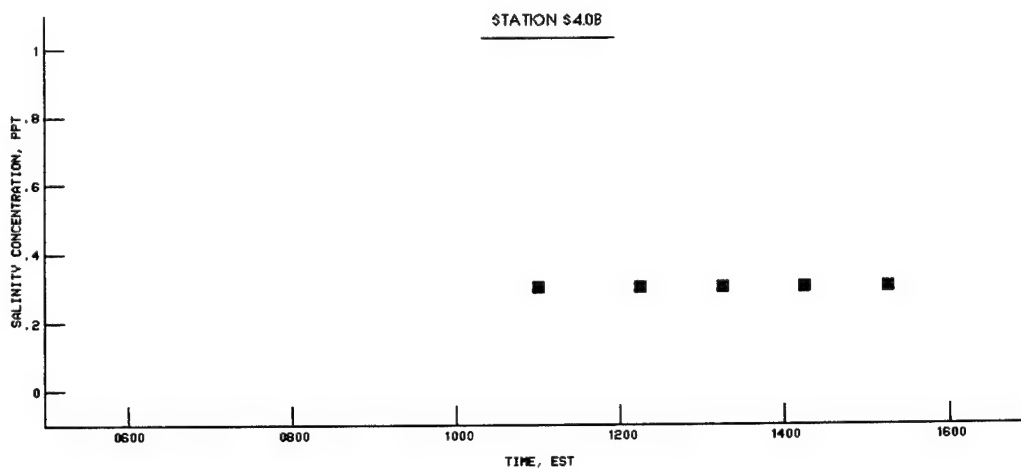
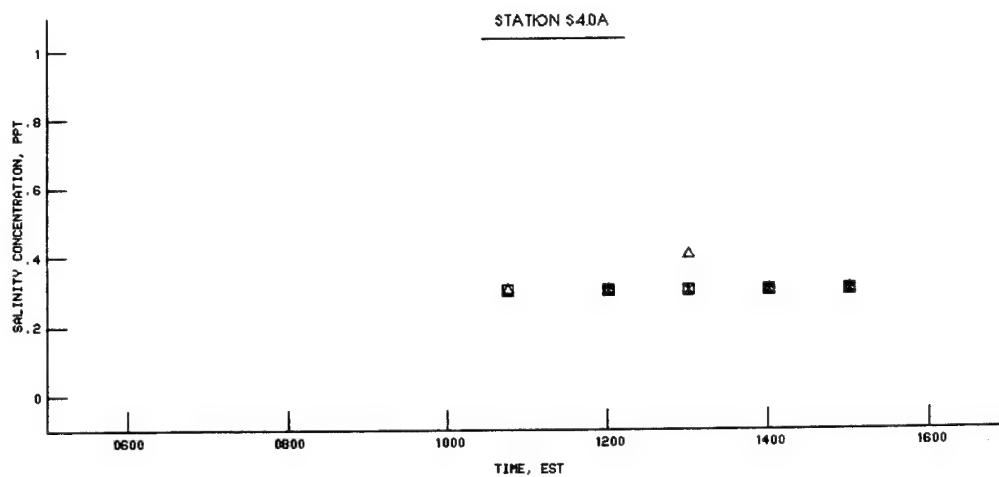
**SALINITY CONCENTRATION
STATIONS S3.0A, S3.0B, AND S3.0C
04/29/93**



LEGEND

- - SURFACE
- △ - MIDDEPTH
- * - BOTTOM

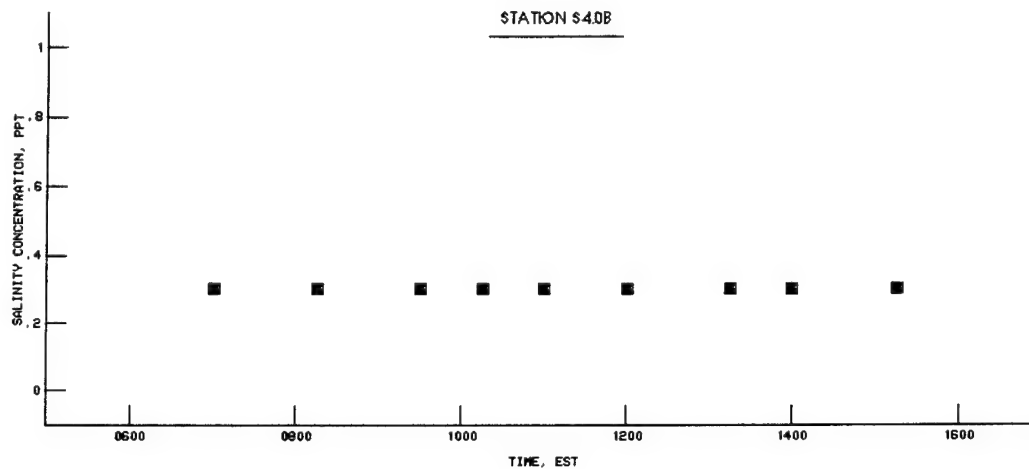
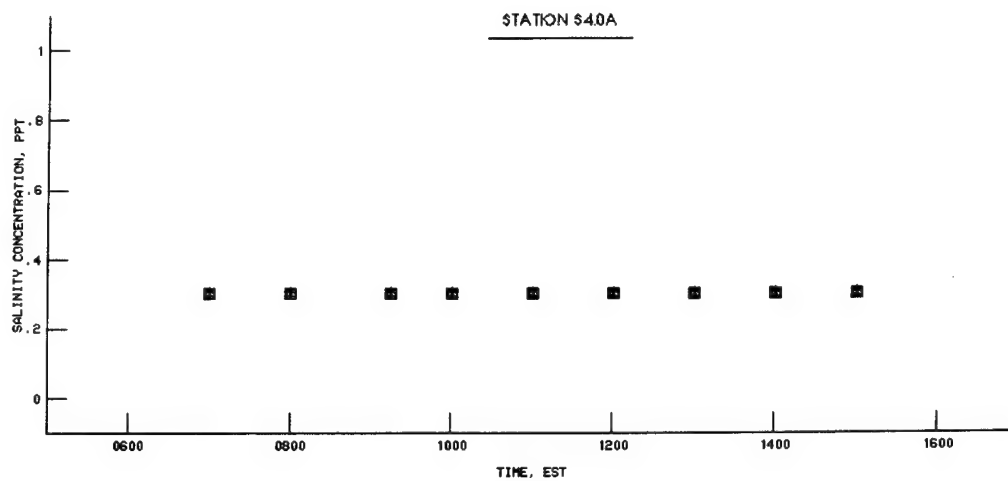
**SALINITY CONCENTRATION
STATIONS S4.0A AND S4.0B
04/20/93**



LEGEND

- - SURFACE
- △ - MIDDEPTH
- ✕ - BOTTOM

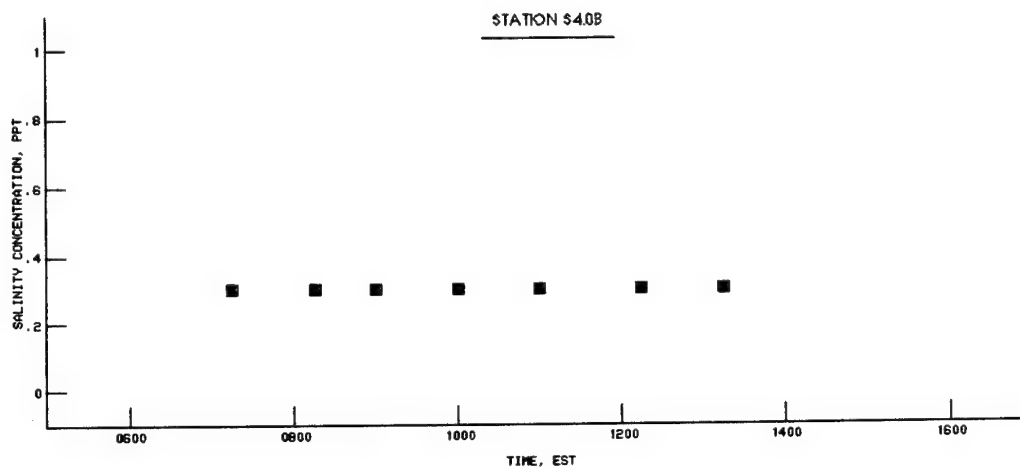
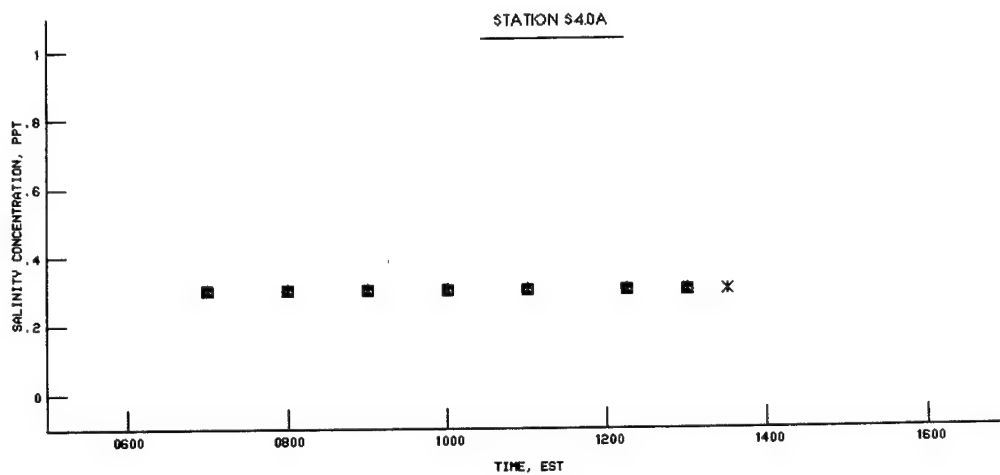
**SALINITY CONCENTRATION
STATIONS S4.0A AND S4.0B
04/22/93**



LEGEND

- - SURFACE
- △ - MIDDEPTH
- ✕ - BOTTOM

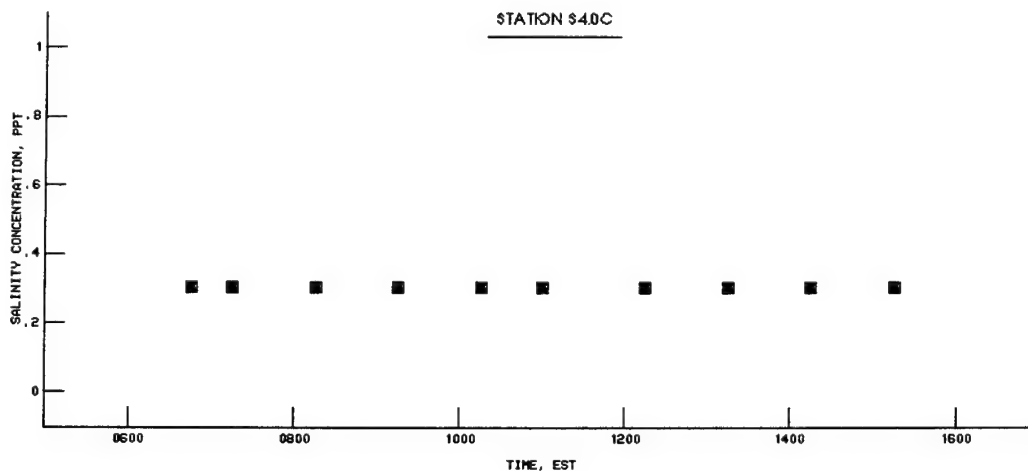
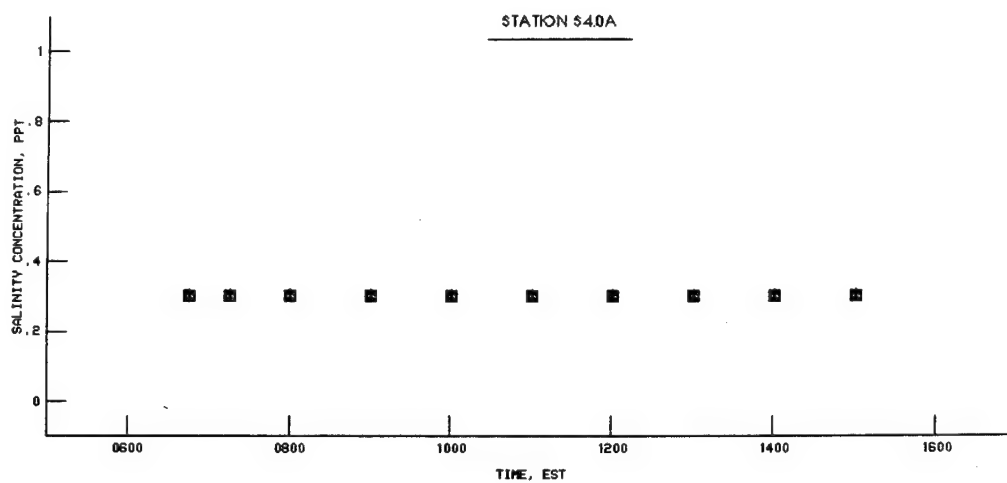
**SALINITY CONCENTRATION
STATIONS S4.0A AND S4.0B
04/23/93**



LEGEND

- - SURFACE
- △ - MIDDEPTH
- * - BOTTOM

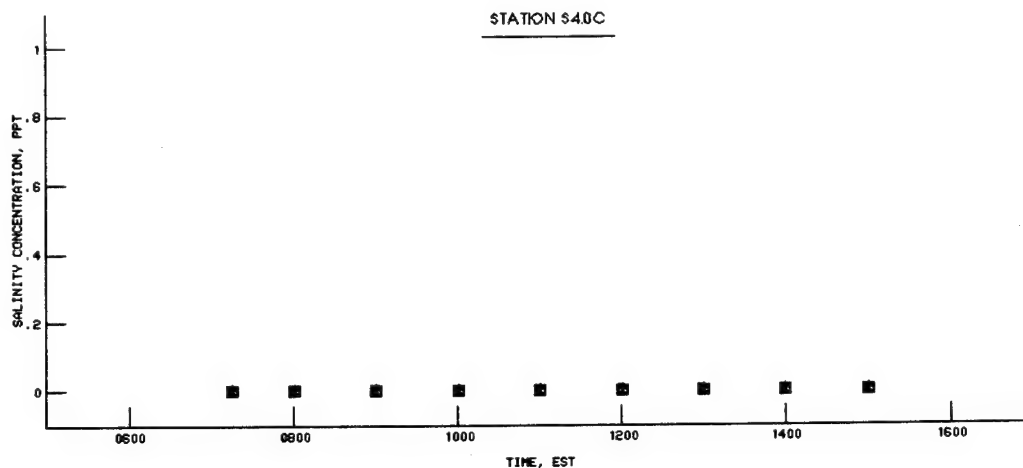
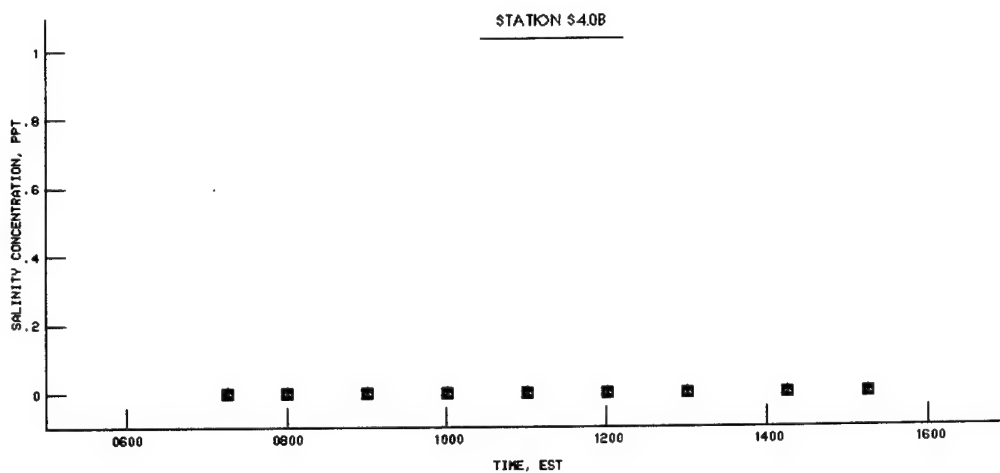
**SALINITY CONCENTRATION
STATIONS S4.0A AND S4.0B
04/26/93**



LEGEND

- - SURFACE
- △ - MIDDEPTH
- ✕ - BOTTOM

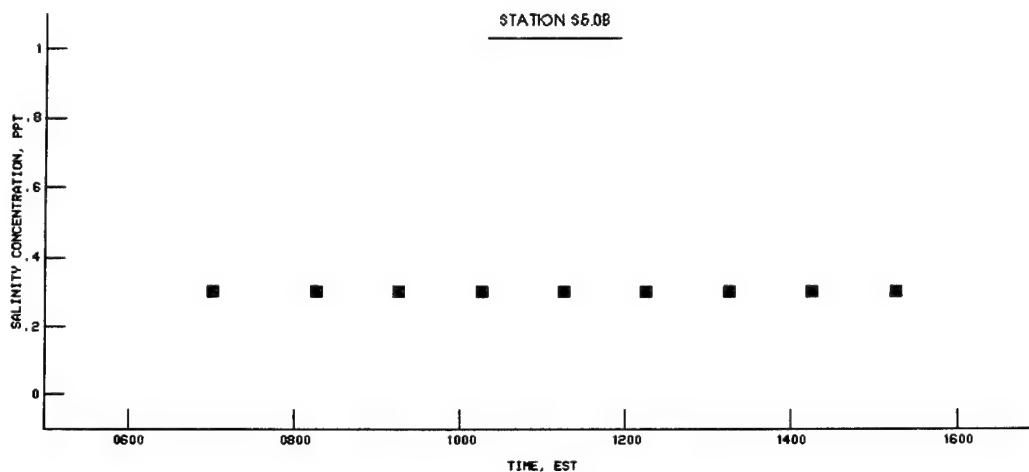
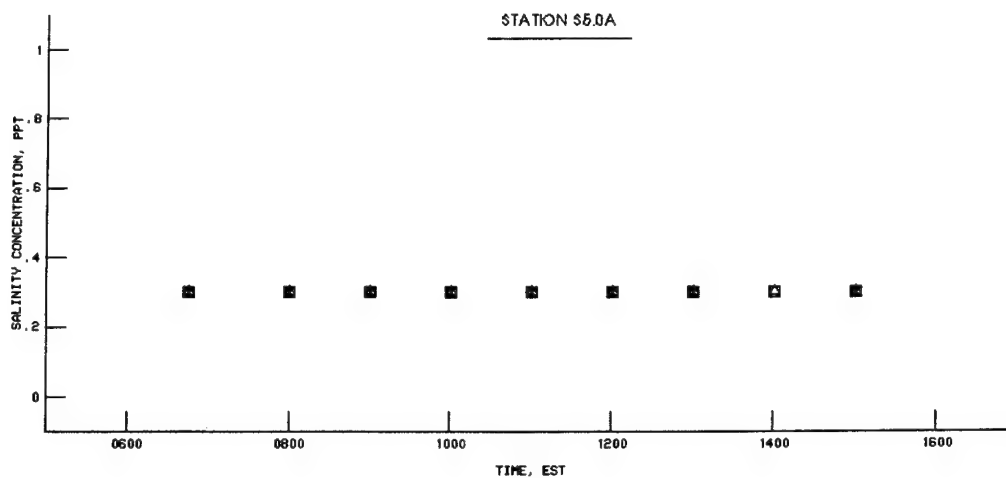
**SALINITY CONCENTRATION
STATIONS S4.0A AND S4.0C
04/28/93**



LEGEND

- - SURFACE
- △ - MIDDEPTH
- ✕ - BOTTOM

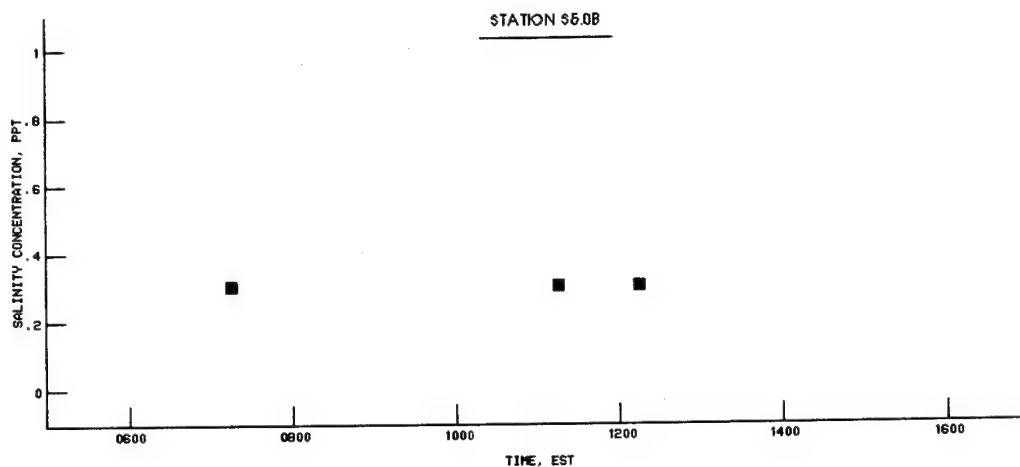
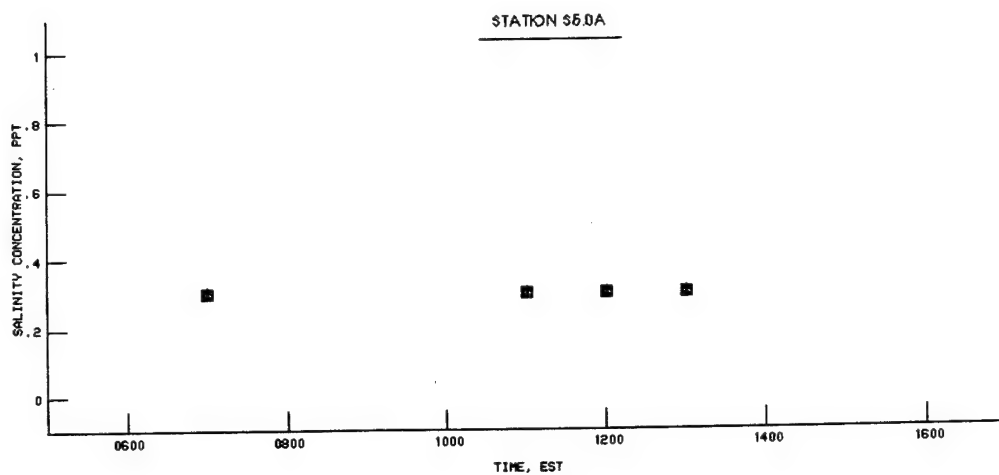
**SALINITY CONCENTRATION
STATIONS S4.0B AND S4.0C
04/30/93**



LEGEND

- - SURFACE
- △ - MIDDEPTH
- ✱ - BOTTOM

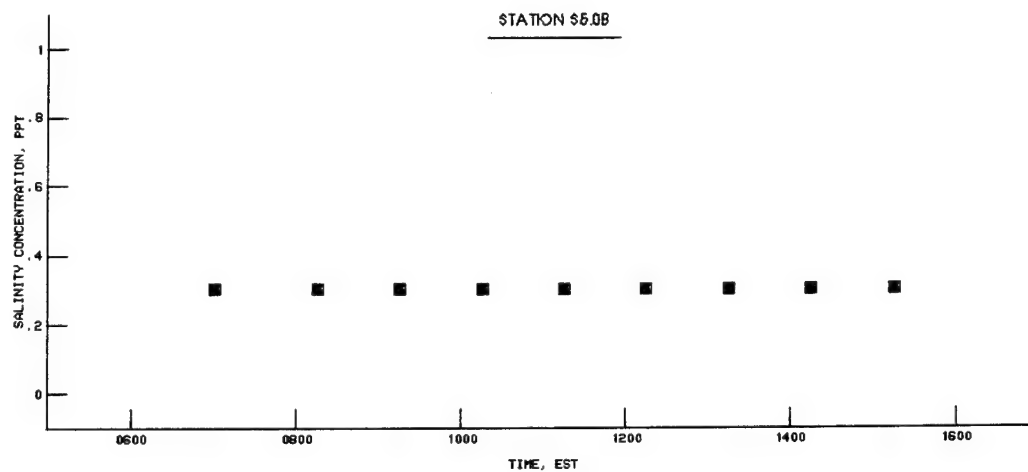
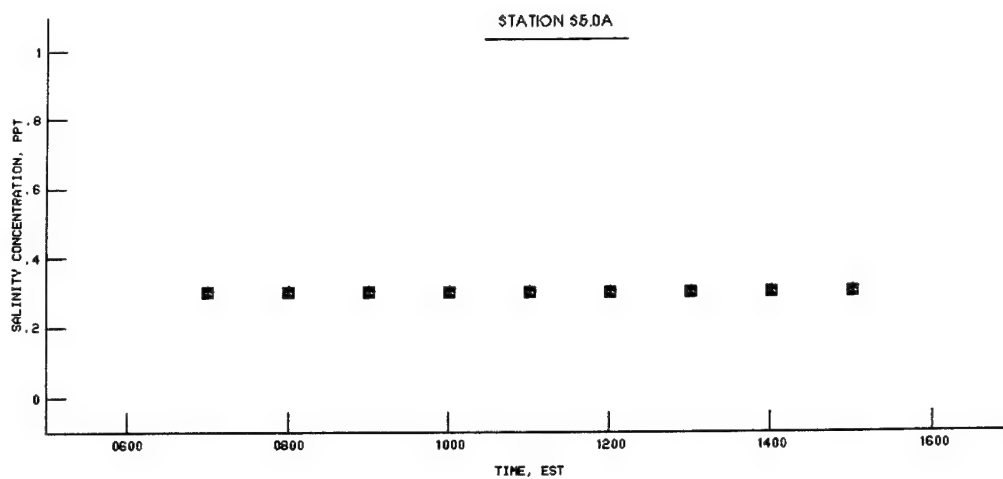
**SALINITY CONCENTRATION
STATIONS S5.0A AND S5.0B
04/21/93**



LEGEND

- - SURFACE
- △ - MIDDEPTH
- * - BOTTOM

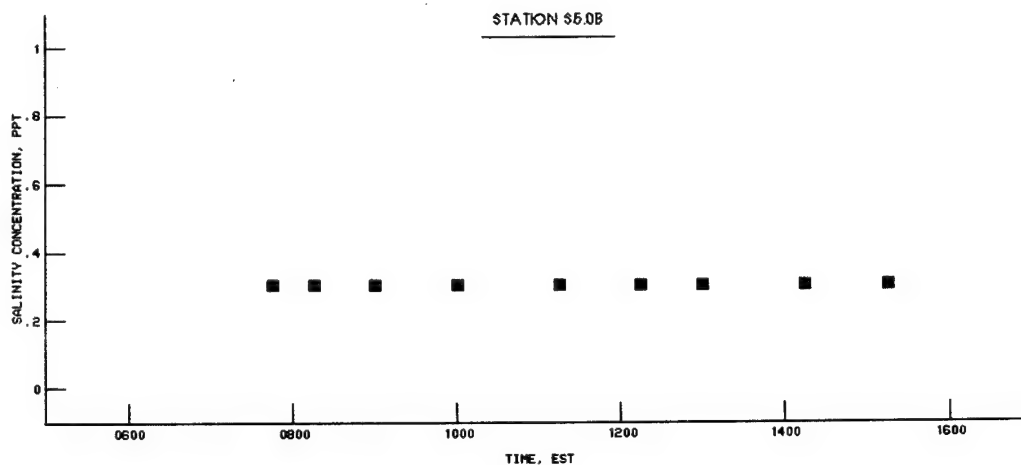
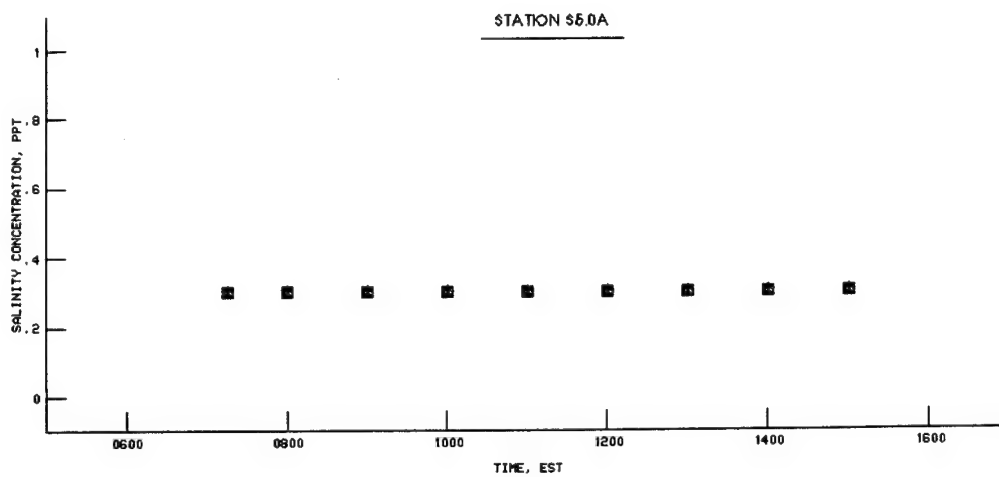
**SALINITY CONCENTRATION
STATIONS S5.0A AND S5.0B
04/24/93**



LEGEND

- - SURFACE
- △ - MDDDEPTH
- ✕ - BOTTOM

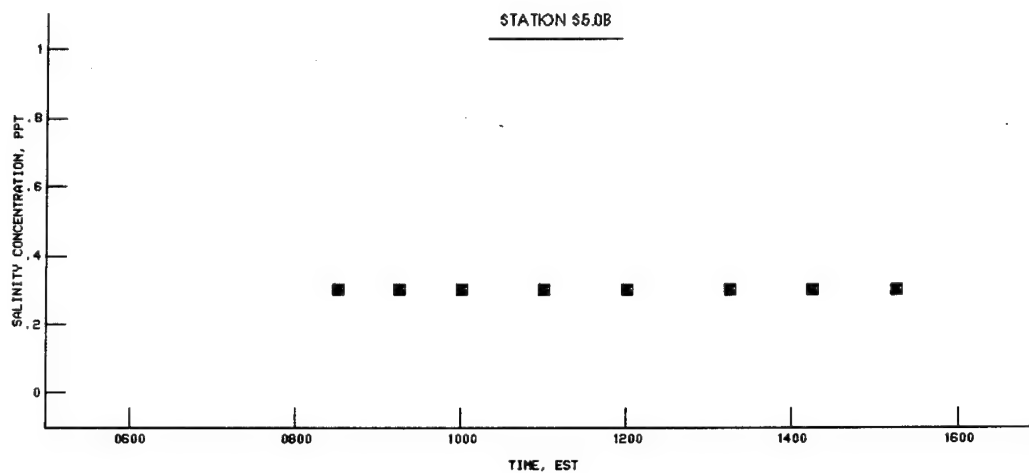
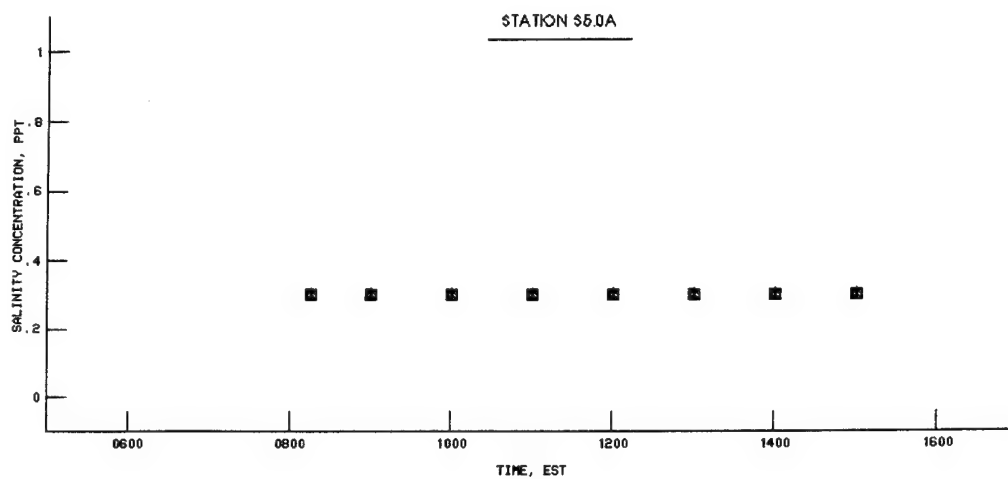
**SALINITY CONCENTRATION
STATIONS S5.0A AND 5.0B
04/25/93**



LEGEND

- - SURFACE
- △ - MIDDEPTH
- ✱ - BOTTOM

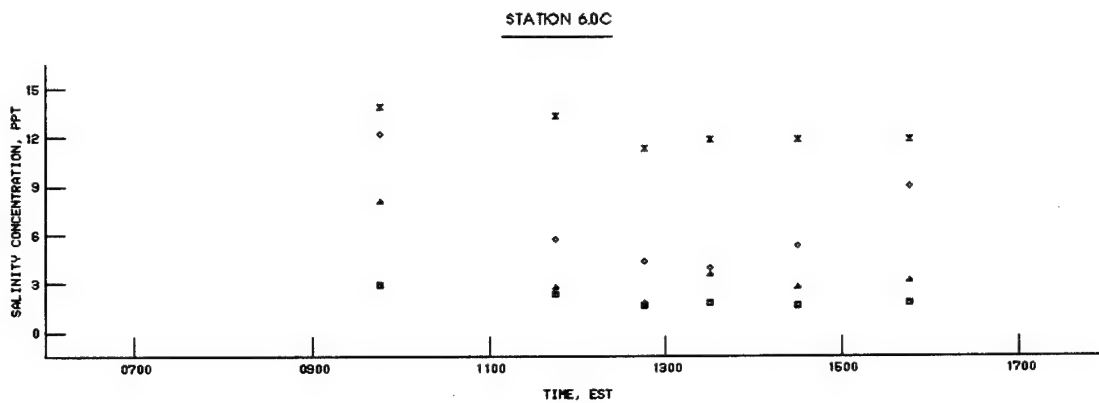
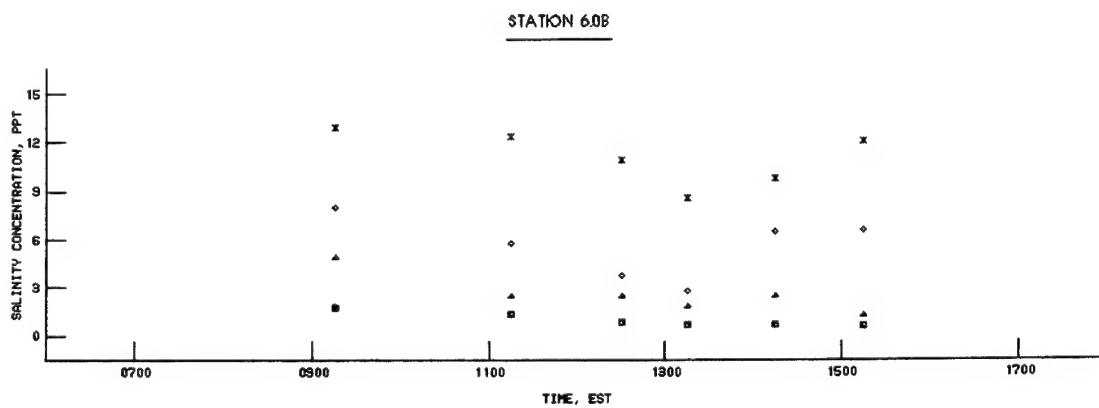
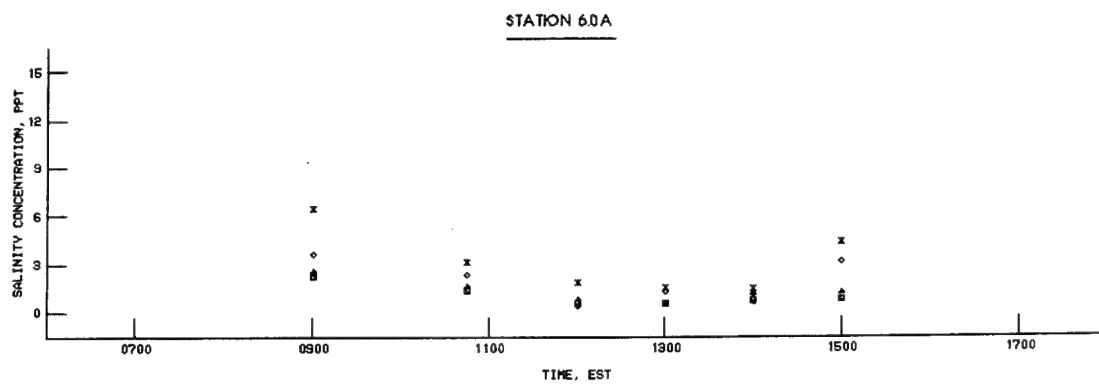
**SALINITY CONCENTRATION
STATIONS S5.0A AND S5.0B
04/27/93**



LEGEND

- - SURFACE
- △ - MIDDEPTH
- * - BOTTOM

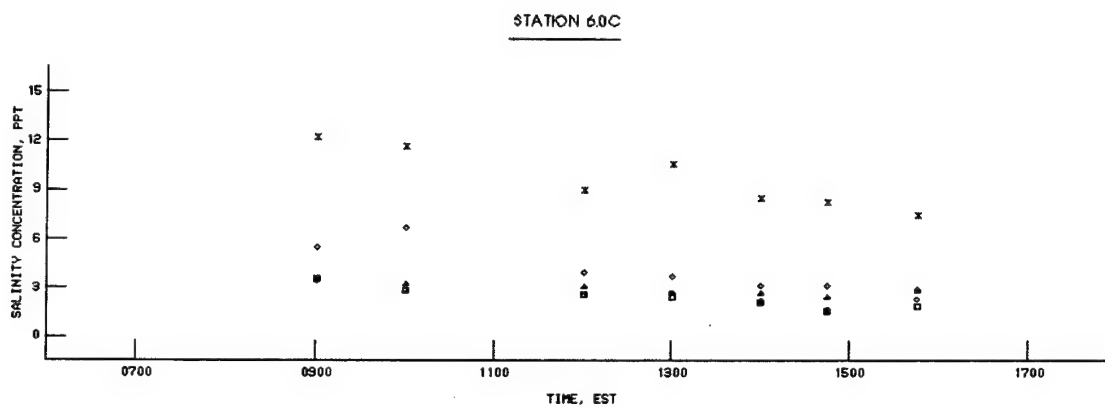
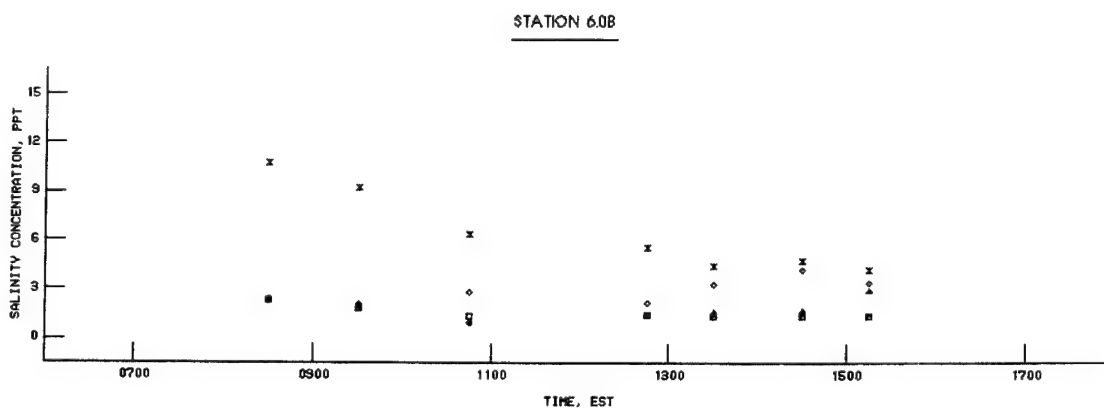
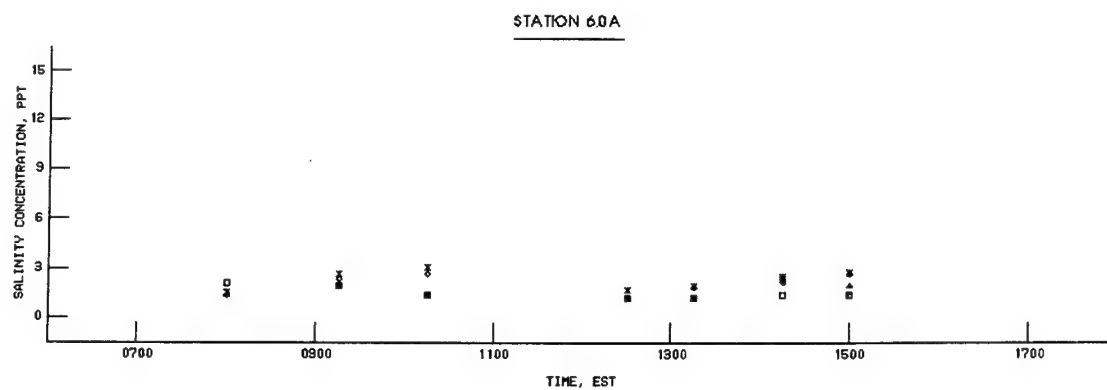
**SALINITY CONCENTRATION
STATIONS S5.0A AND S5.0B
04/29/93**



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- * - BOTTOM

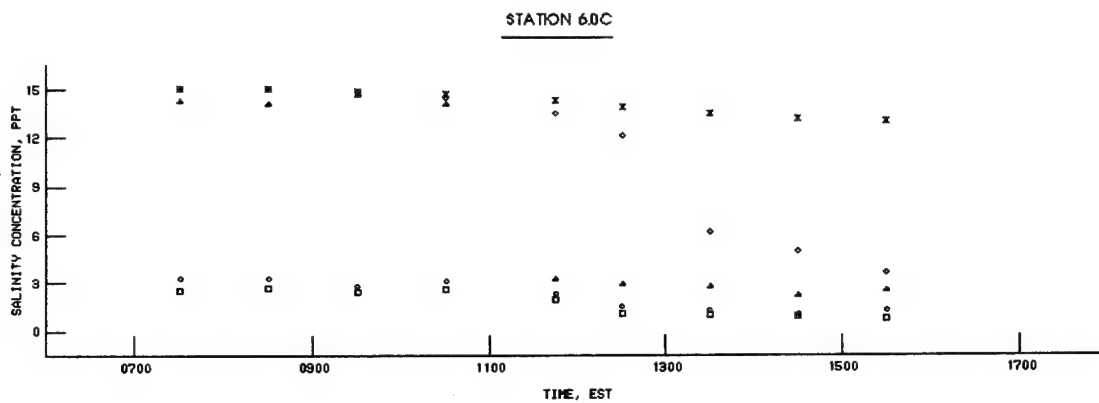
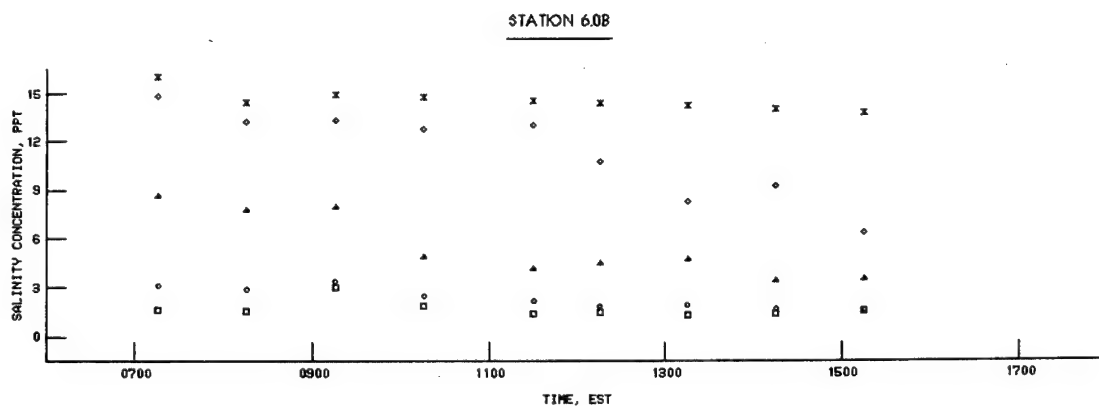
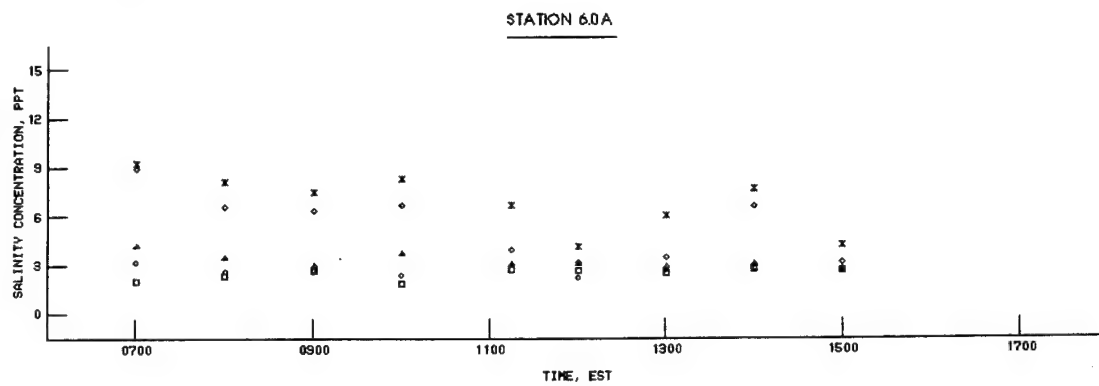
**SALINITY CONCENTRATION
STATIONS S6.0A, S6.0B, AND S6.0C
04/19/93**



LEGEND

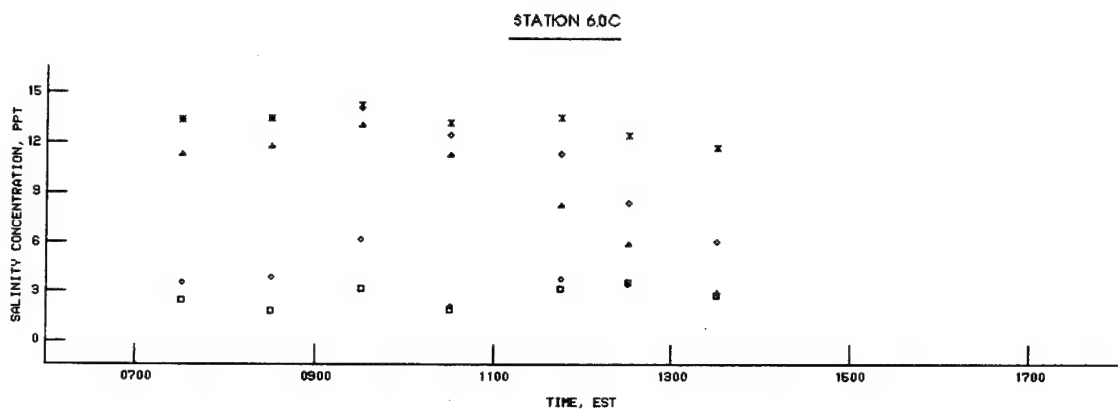
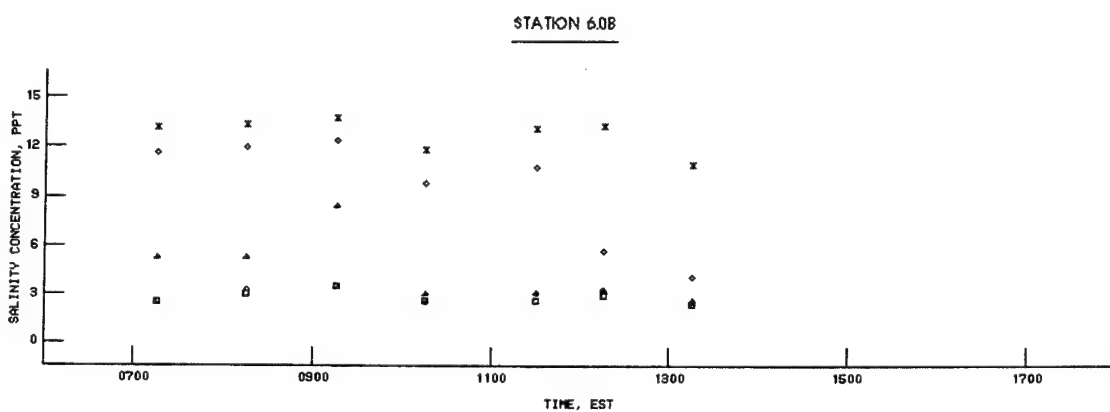
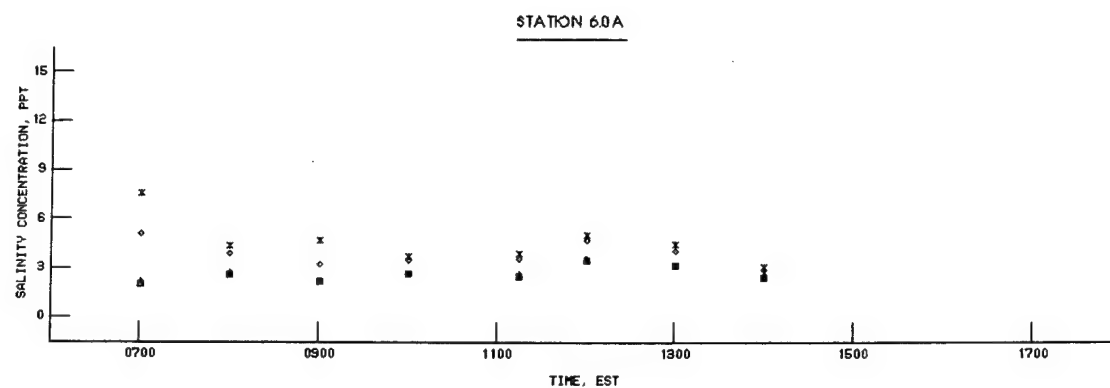
- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- ✕ - BOTTOM

**SALINITY CONCENTRATION
STATIONS S6.0A, S6.0B, AND S6.0C
04/20/93**



- LEGEND
- - SURFACE
 - - ONE-QUARTER DEPTH
 - △ - MIDDEPTH
 - ◇ - THREE-QUARTER DEPTH
 - × - BOTTOM

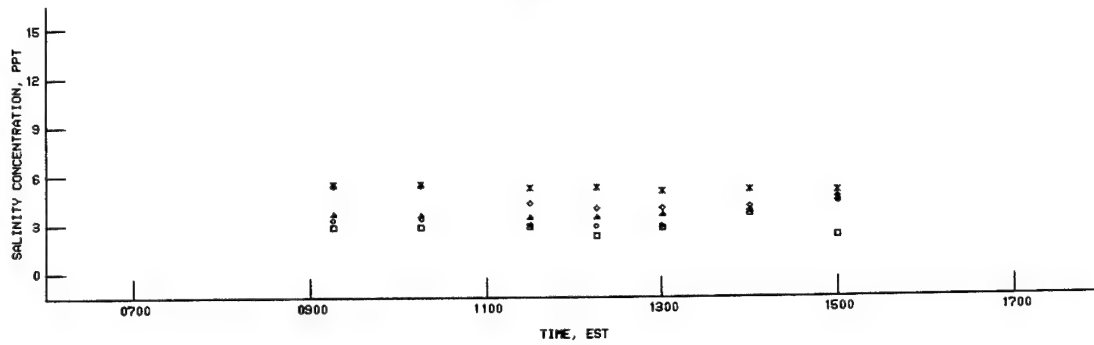
**SALINITY CONCENTRATION
STATIONS S6.0A, S6.0B, AND S6.0C
04/24/93**



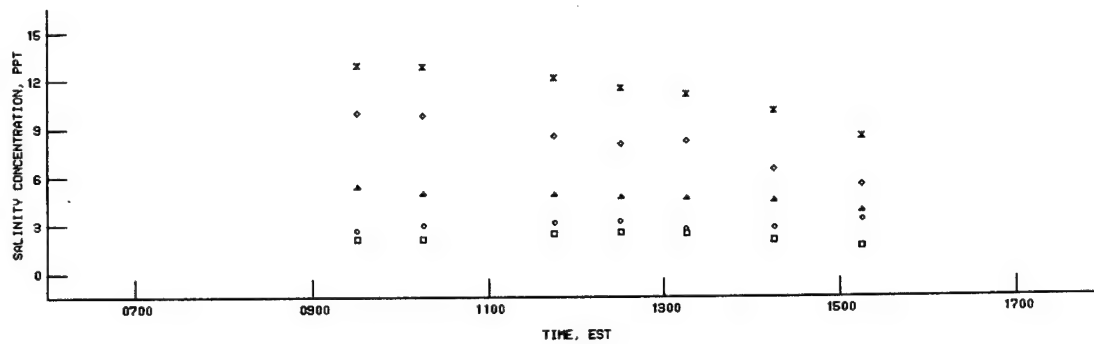
- LEGEND
- - SURFACE
 - - ONE-QUARTER DEPTH
 - △ - MIDDEPTH
 - ◇ - THREE-QUARTER DEPTH
 - X - BOTTOM

**SALINITY CONCENTRATION
STATIONS S6.0A, S6.0B, AND S6.0C
04/25/93**

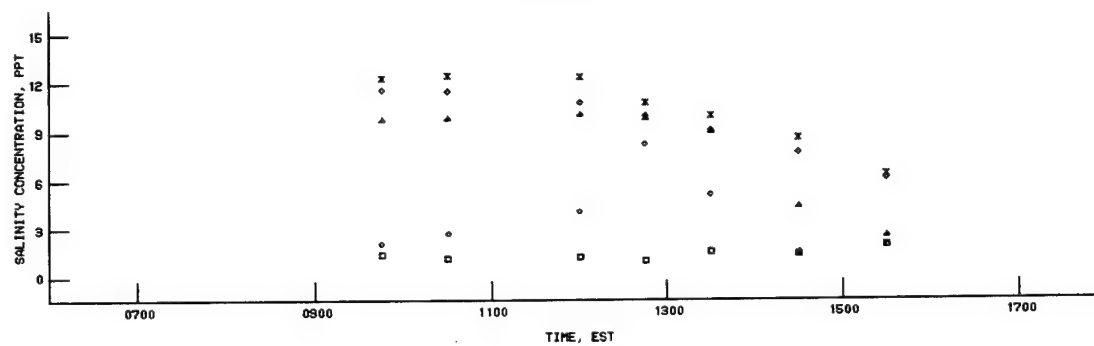
STATION 6.0A



STATION 6.0B



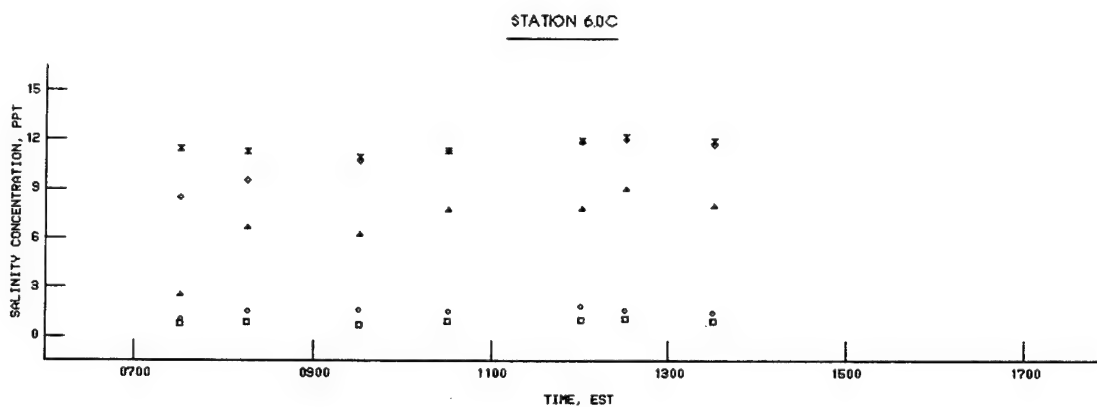
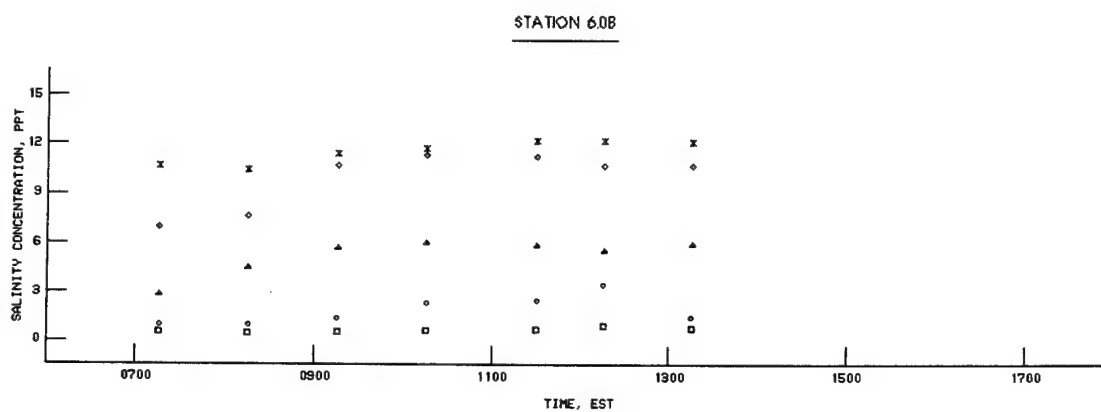
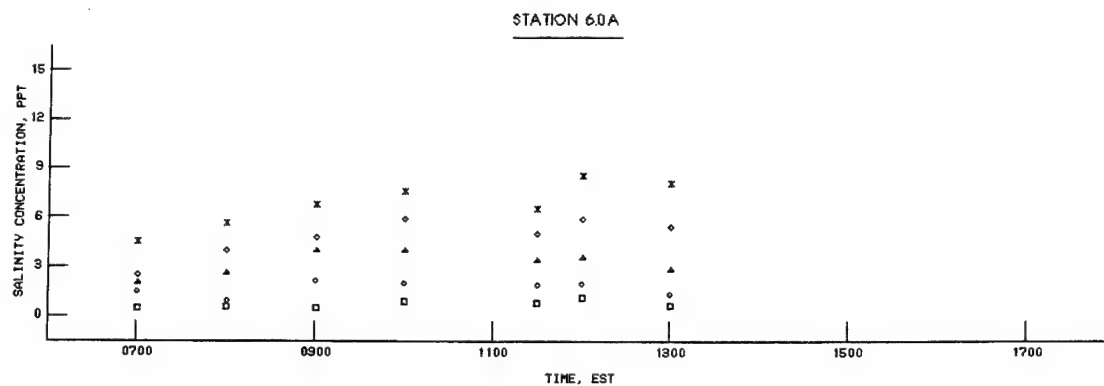
STATION 6.0C



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- X - BOTTOM

SALINITY CONCENTRATION
STATIONS S6.0A, S6.0B, AND S6.0C
04/28/93

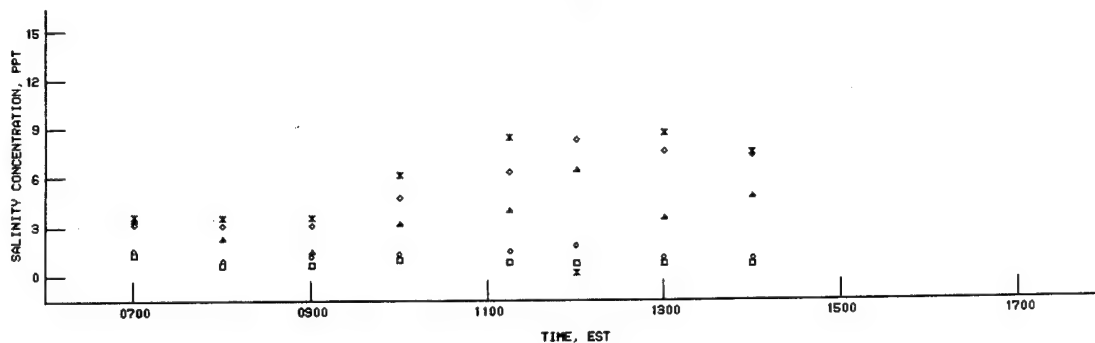


LEGEND

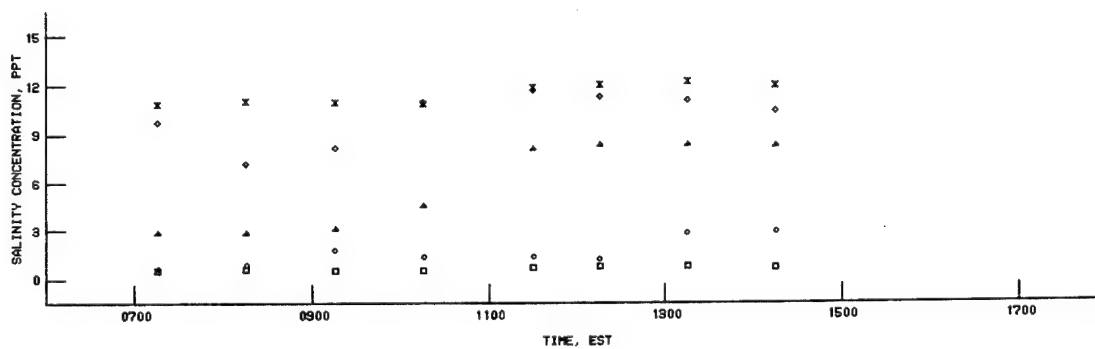
- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- * - BOTTOM

**SALINITY CONCENTRATION
STATIONS S6.0A, S6.0B, AND S6.0C
04/29/93**

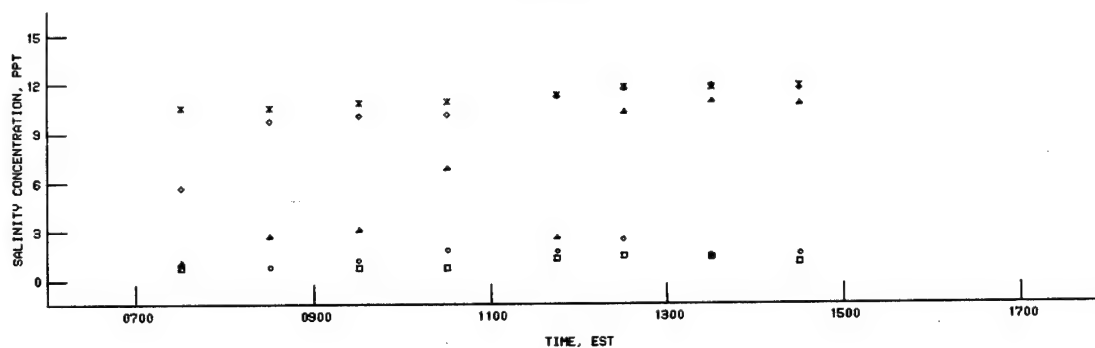
STATION 6.0A



STATION 6.0B



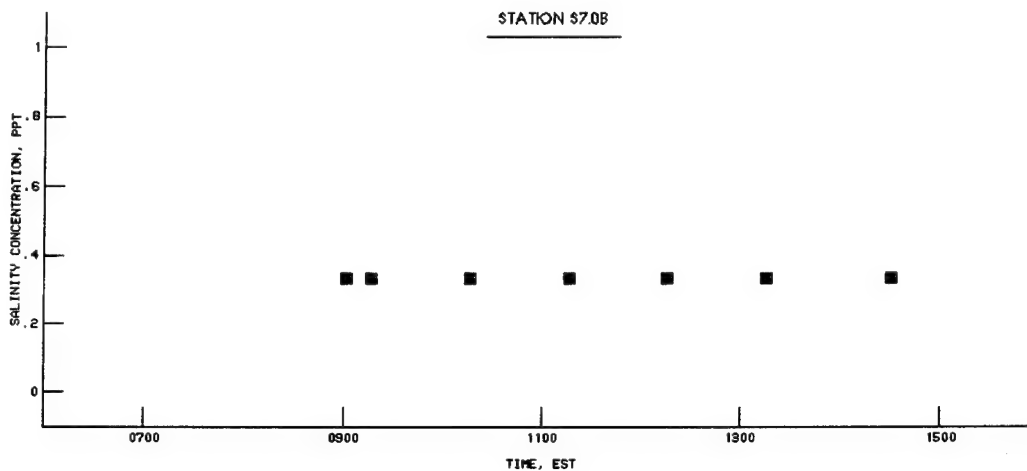
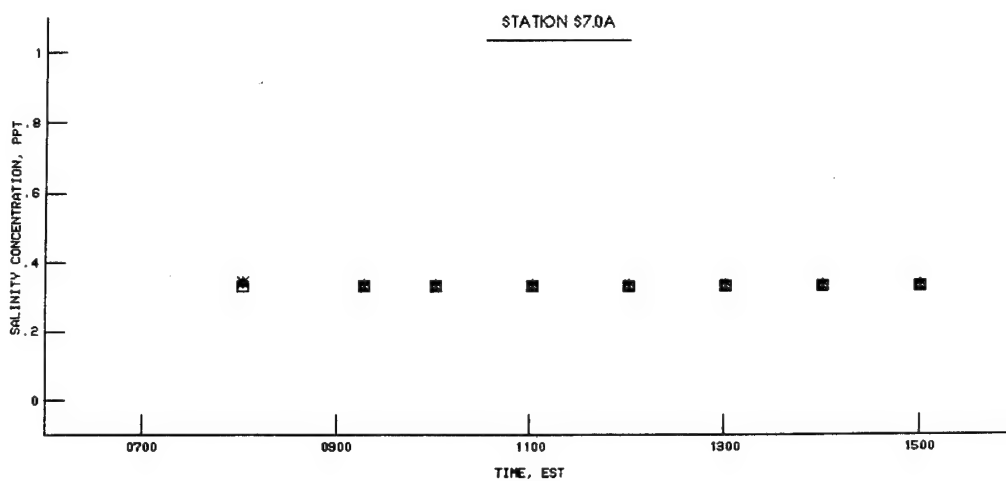
STATION 6.0C



LEGEND

- - SURFACE
- - ONE-QUARTER DEPTH
- △ - MIDDEPTH
- ◇ - THREE-QUARTER DEPTH
- × - BOTTOM

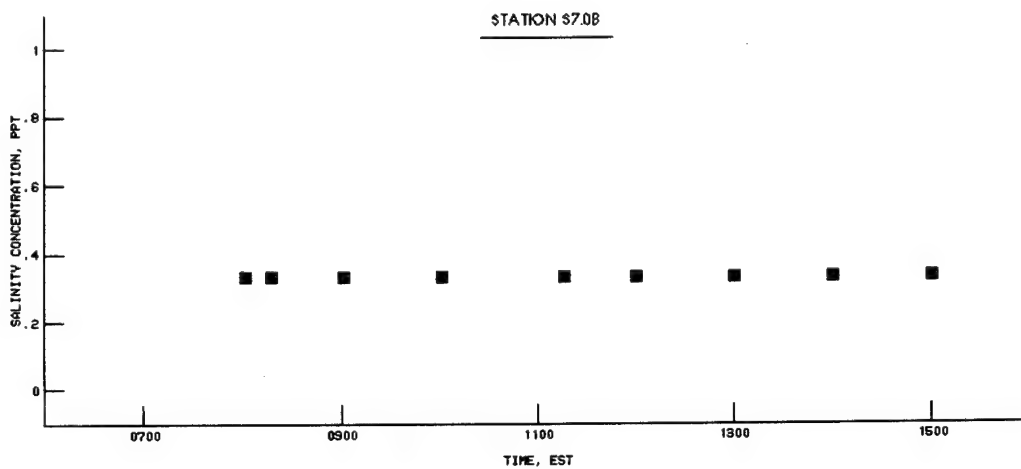
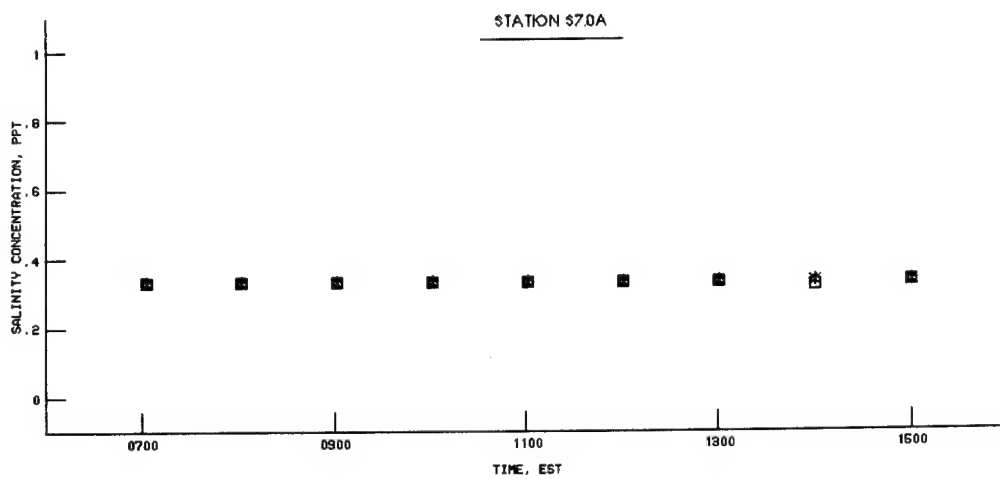
**SALINITY CONCENTRATION
STATIONS S6.0A, S6.0B, AND S6.0C
04/30/93**



LEGEND

- - SURFACE
- △ - MIDDEPTH
- * - BOTTOM

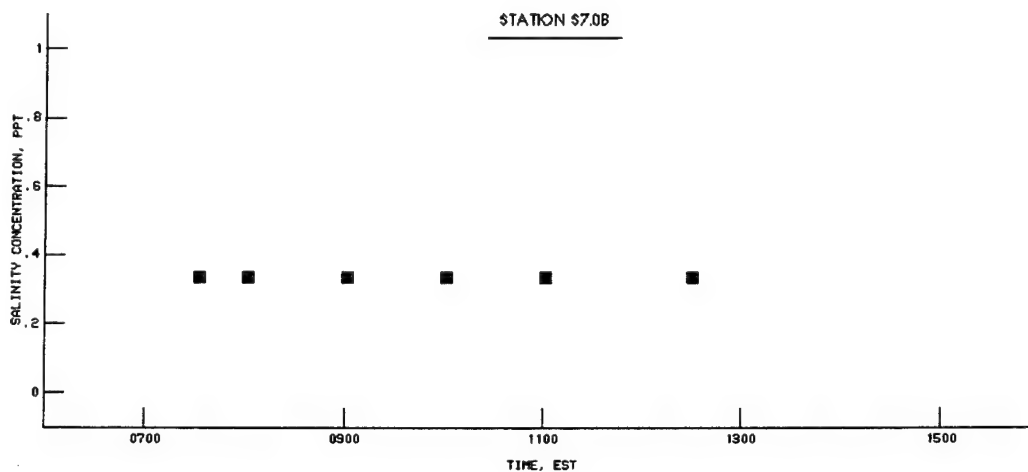
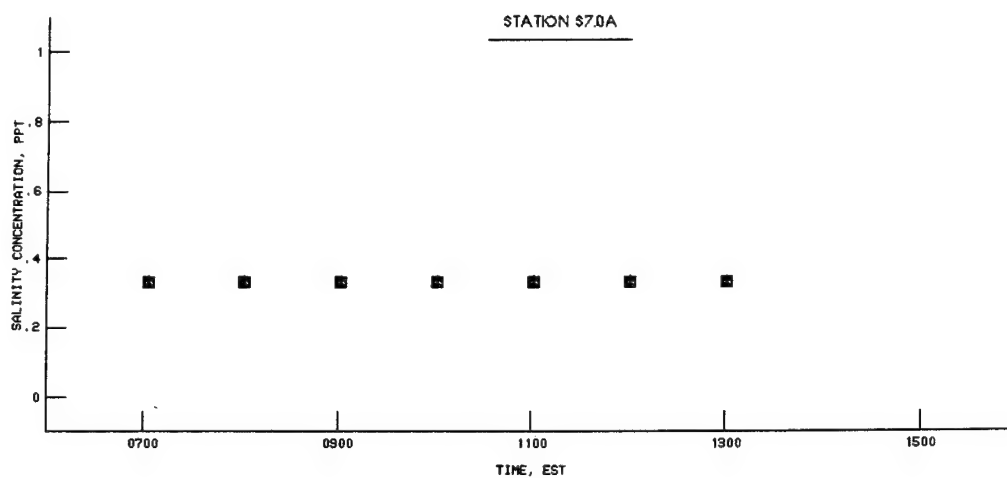
**SALINITY CONCENTRATION
STATIONS S7.0A AND S7.0B
04/19/93**



LEGEND

- - SURFACE
- △ - MIDDEPTH
- ✱ - BOTTOM

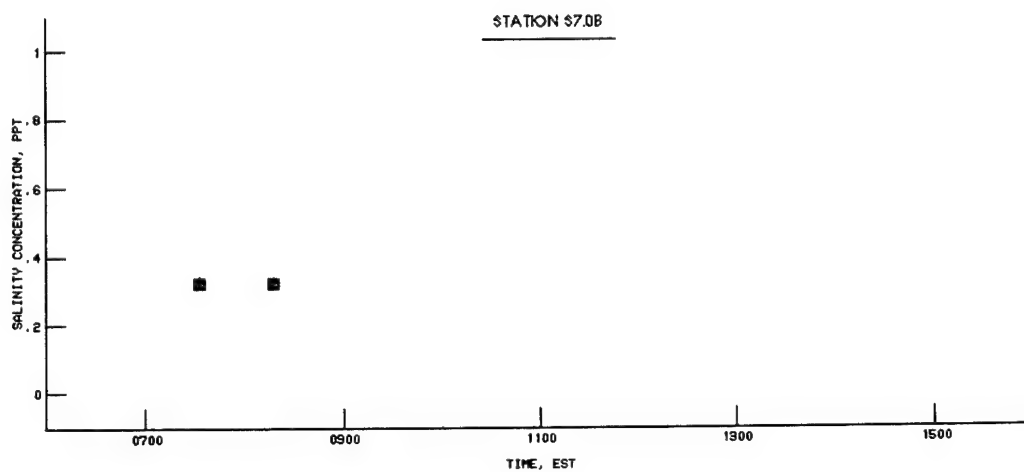
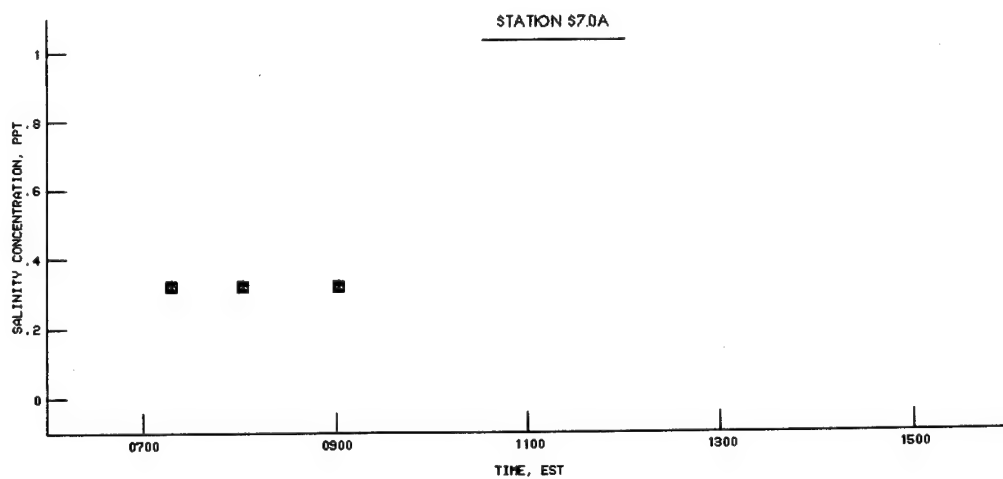
**SALINITY CONCENTRATION
STATIONS S7.0A AND S7.0B
04/20/93**



LEGEND

- - SURFACE
- △ - MIDDEPTH
- ✕ - BOTTOM

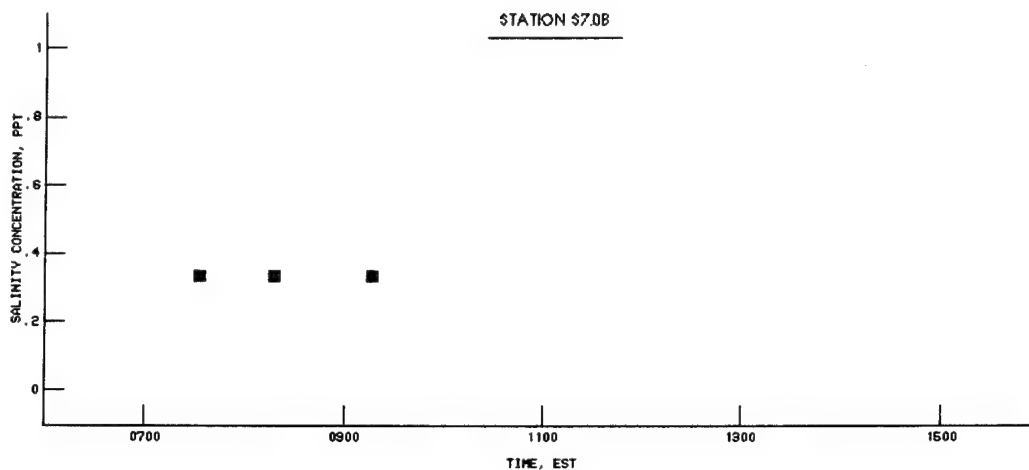
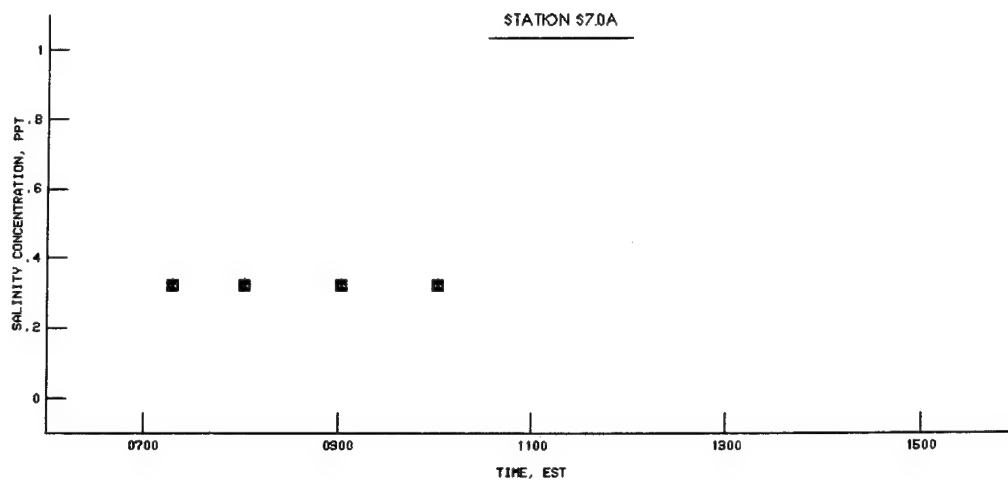
**SALINITY CONCENTRATION
STATIONS S7.0A AND S7.0B
04/21/93**



LEGEND

- - SURFACE
- △ - MIDDEPTH
- ✕ - BOTTOM

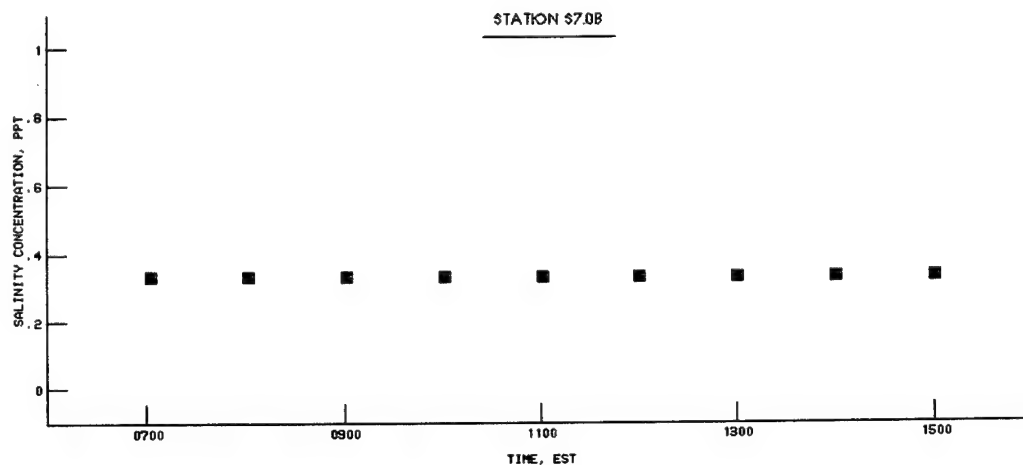
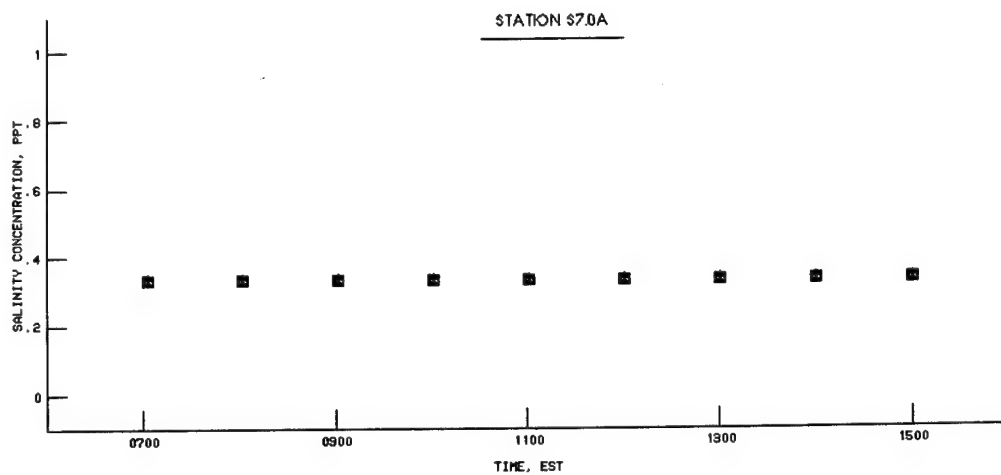
**SALINITY CONCENTRATION
STATIONS S7.0A AND S7.0B
04/22/93**



LEGEND

- - SURFACE
- △ - MIDDEPTH
- ✕ - BOTTOM

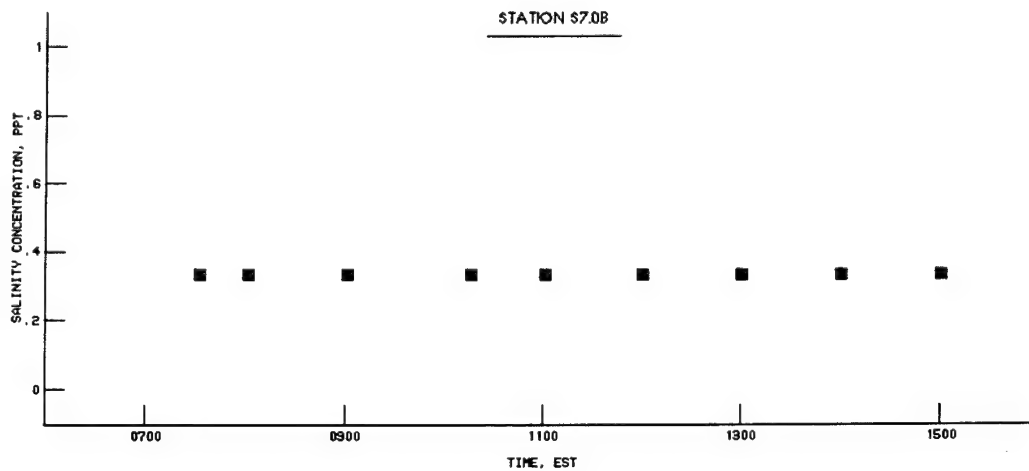
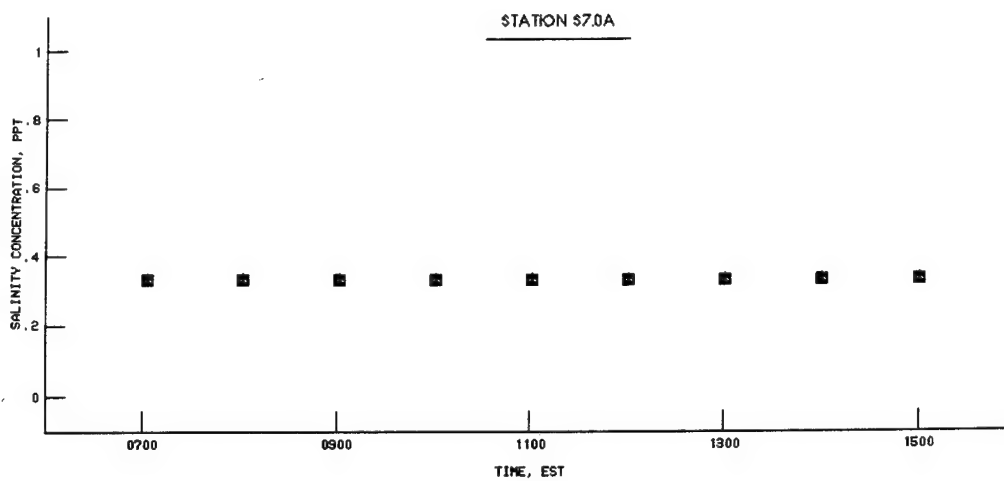
**SALINITY CONCENTRATION
STATIONS S7.0A AND S7.0B
04/23/93**



LEGEND

- - SURFACE
- △ - MIDDDEPTH
- ✕ - BOTTOM

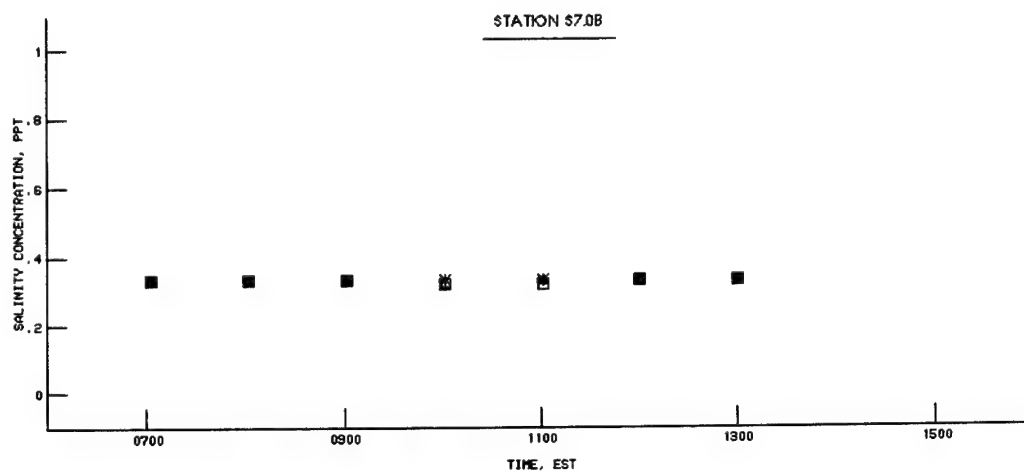
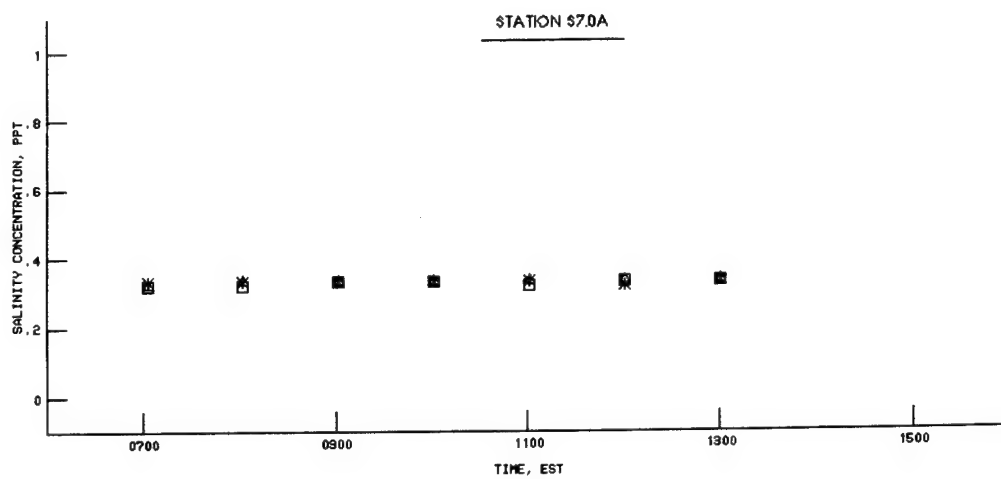
**SALINITY CONCENTRATION
STATIONS S7.0A AND S7.0B
04/24/93**



LEGEND

- - SURFACE
- △ - MIDDEPTH
- ✕ - BOTTOM

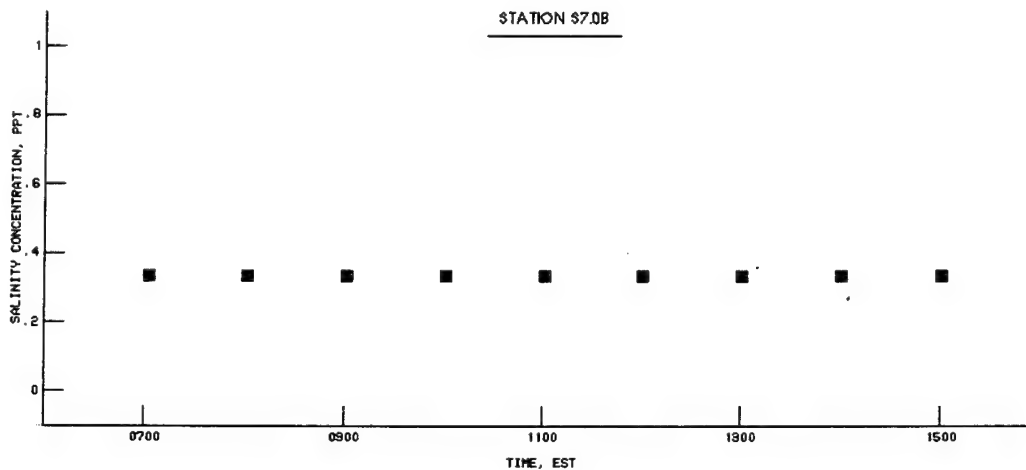
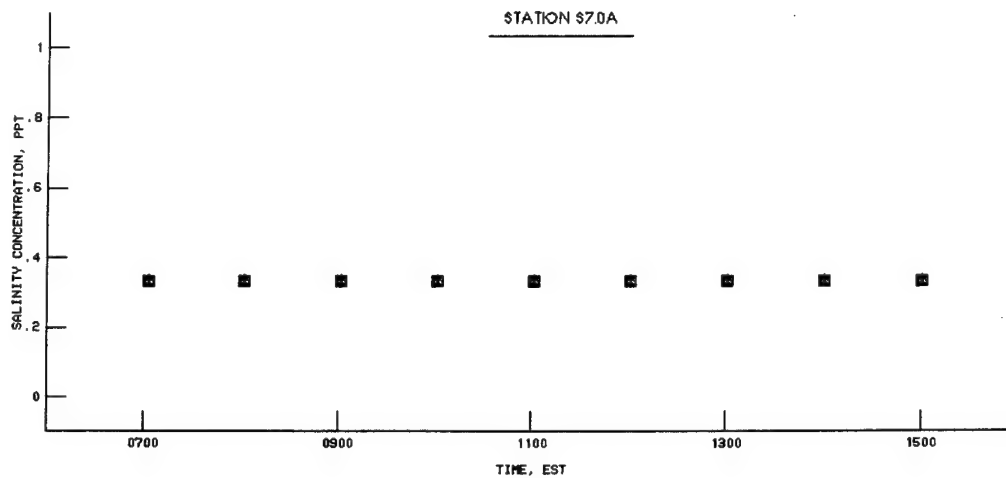
**SALINITY CONCENTRATION
STATIONS S7.0A AND S7.0B
04/25/93**



LEGEND

- - SURFACE
- △ - MIDDEPTH
- ✕ - BOTTOM

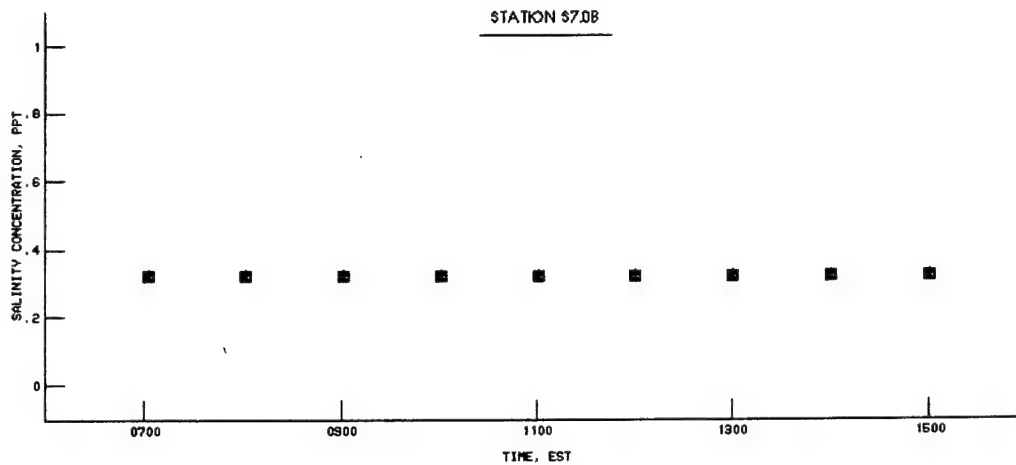
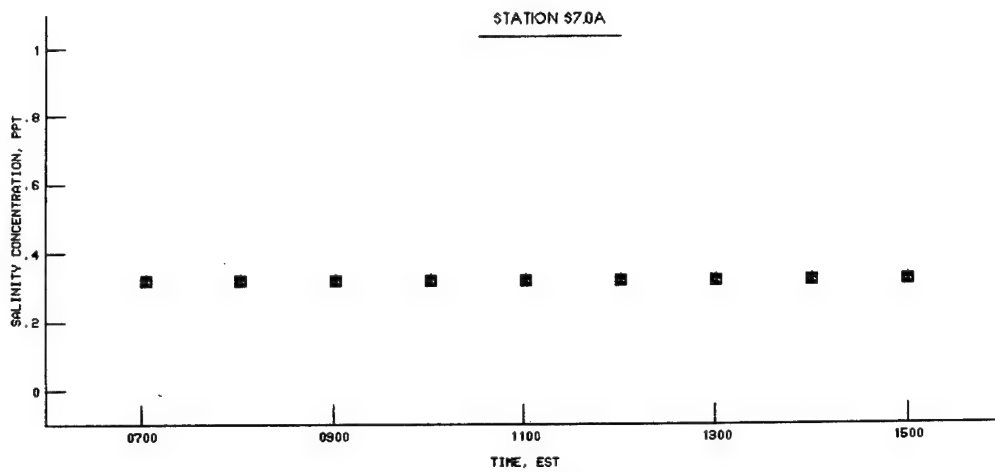
**SALINITY CONCENTRATION
STATIONS S7.0A AND S7.0B
04/26/93**



LEGEND

- - SURFACE
- △ - MIDDEPTH
- * - BOTTOM

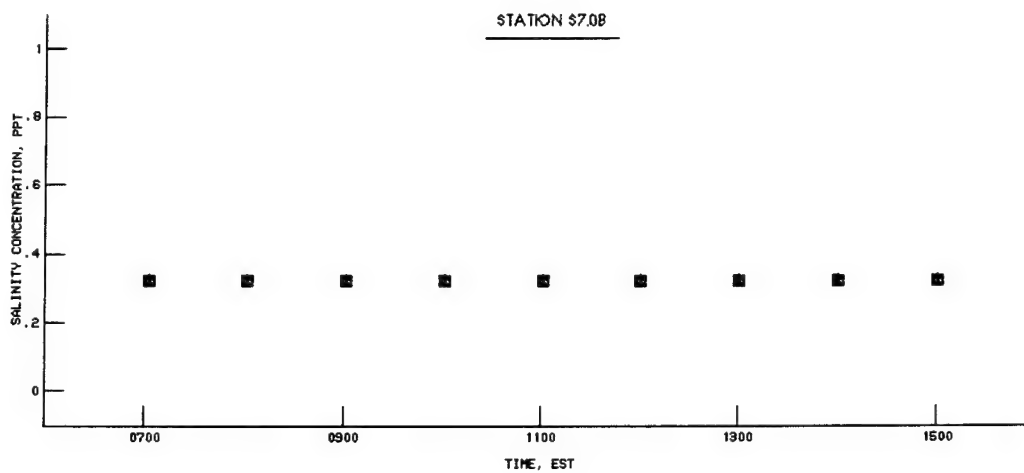
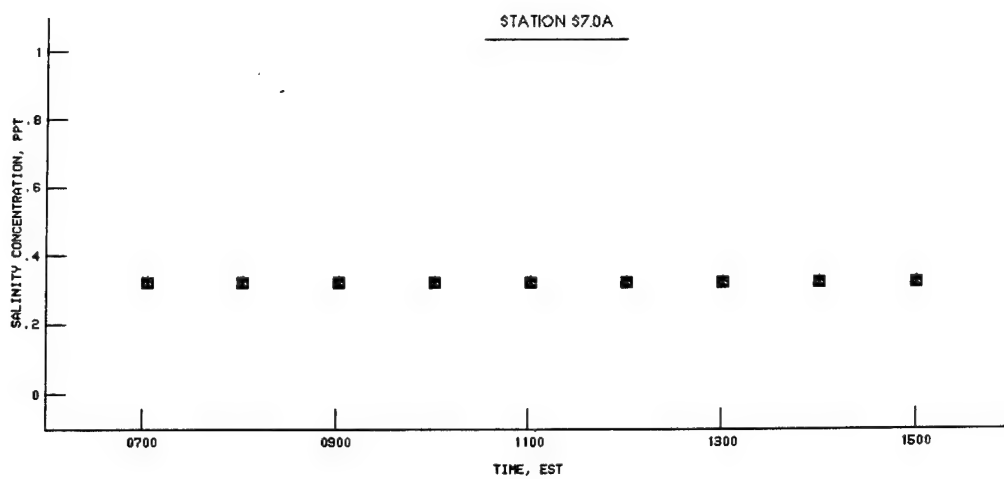
**SALINITY CONCENTRATION
STATIONS S7.0A AND S7.0B
04/27/93**



LEGEND

- - SURFACE
- △ - MIDDEPTH
- ✱ - BOTTOM

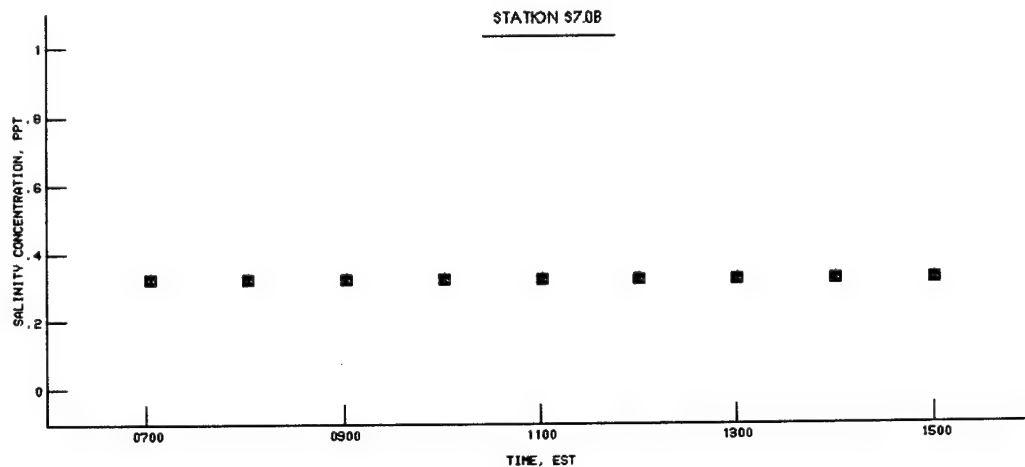
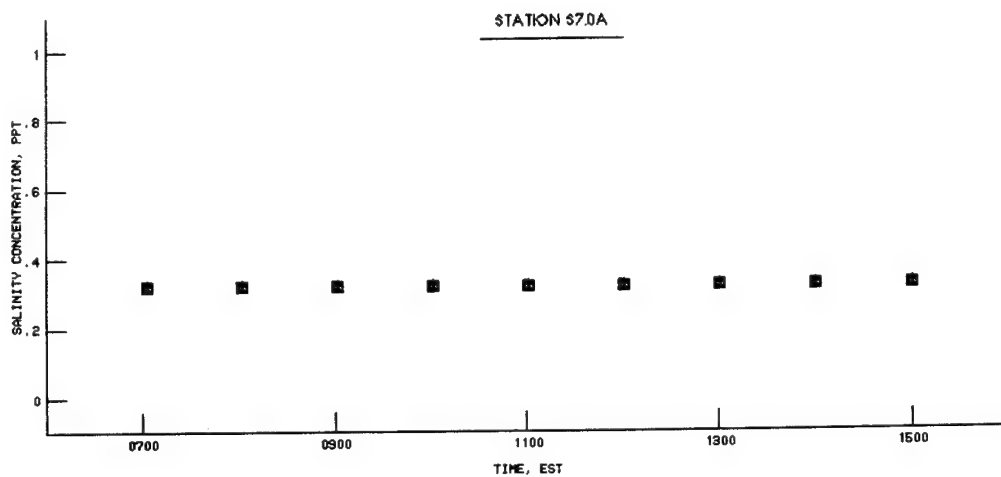
**SALINITY CONCENTRATION
STATIONS S7.0A AND S7.0B
04/28/93**



LEGEND

- - SURFACE
- △ - MIDDEPTH
- ✕ - BOTTOM

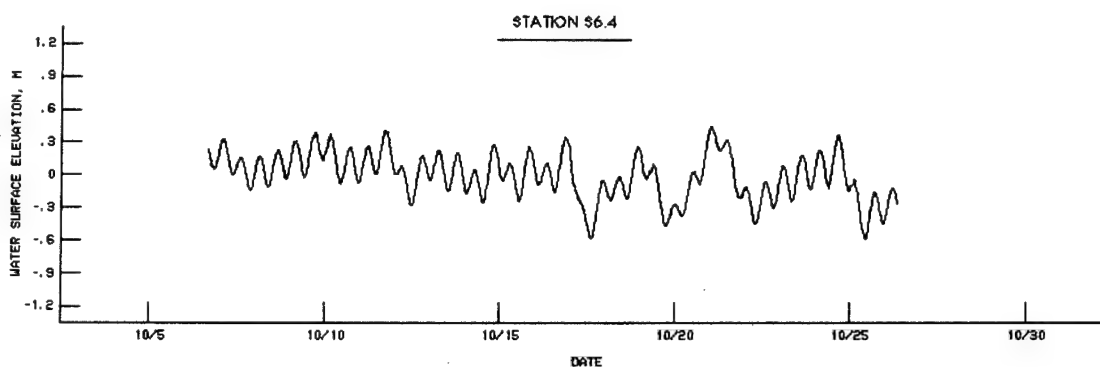
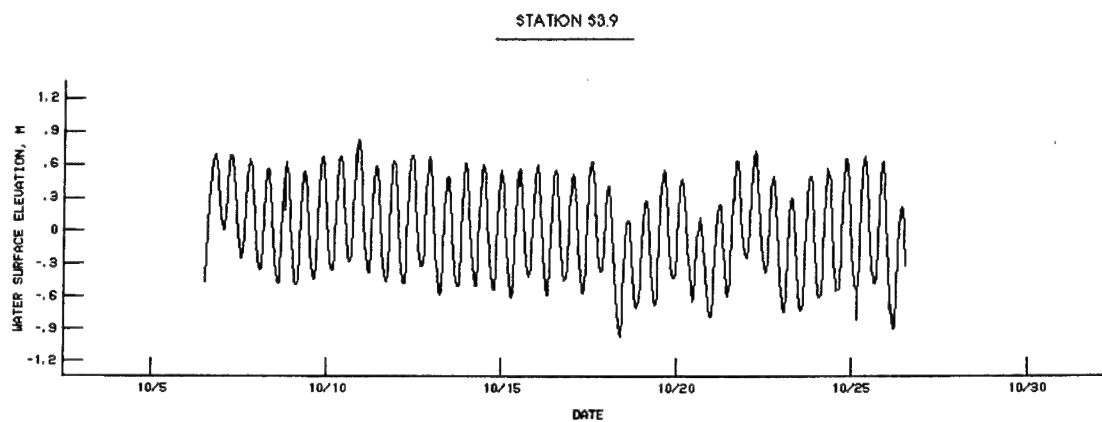
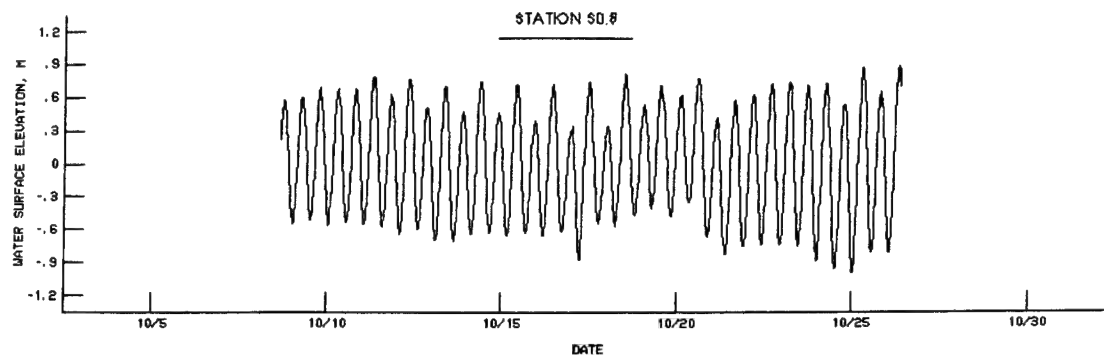
**SALINITY CONCENTRATION
STATIONS S7.0A AND 7.0B
04/29/93**



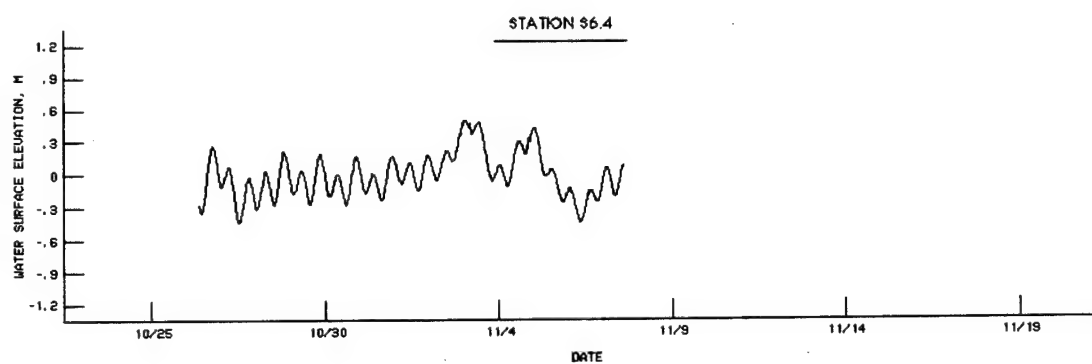
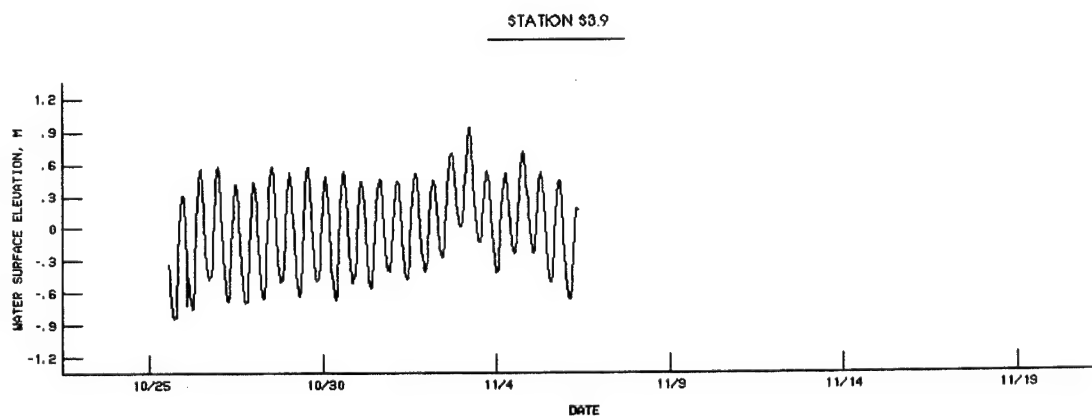
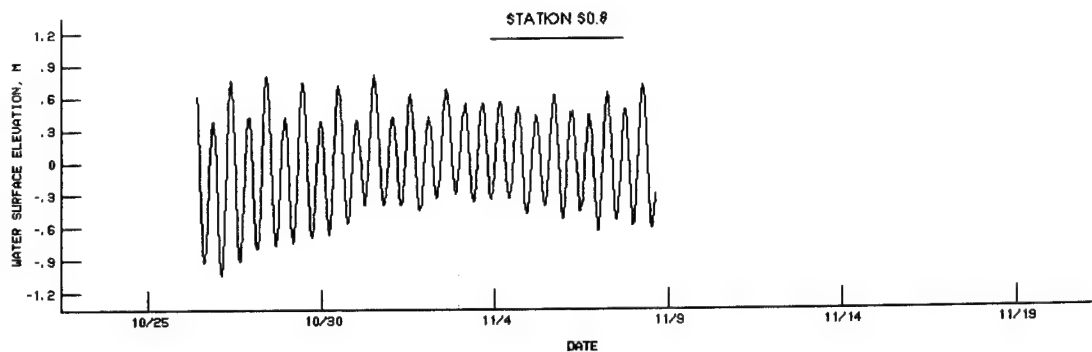
LEGEND

- - SURFACE
- △ - MIDDEPTH
- ✕ - BOTTOM

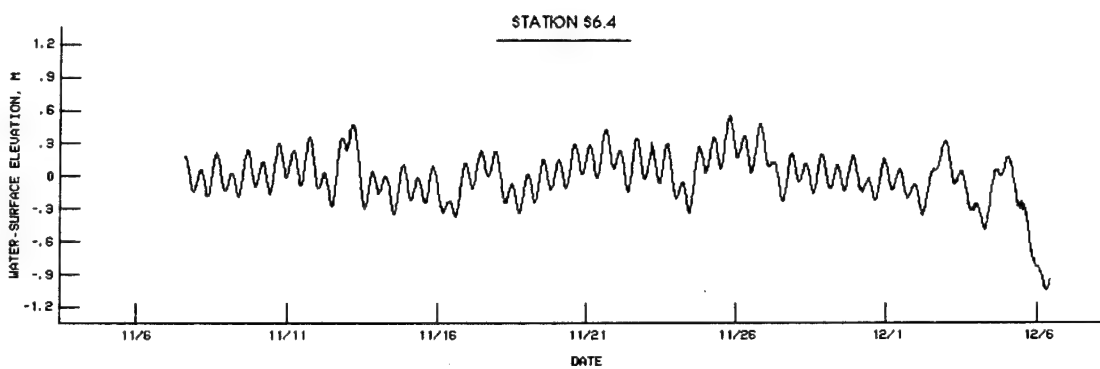
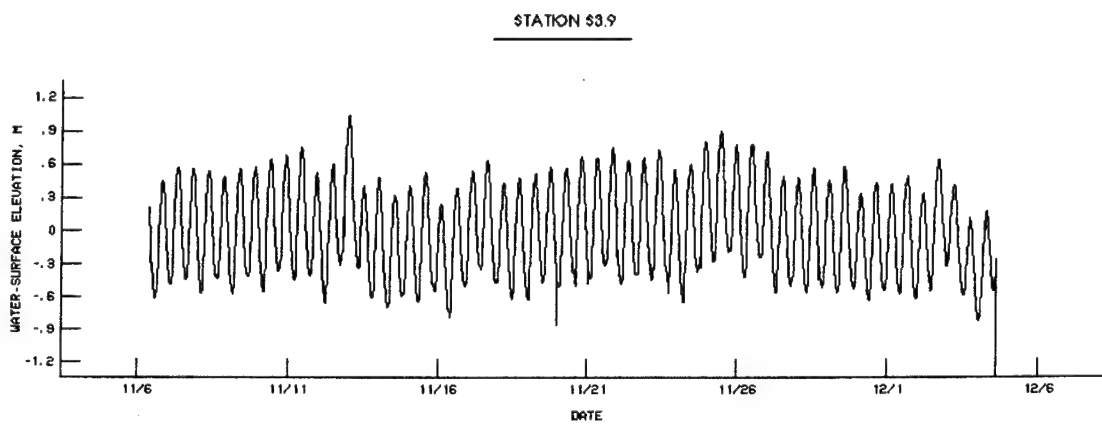
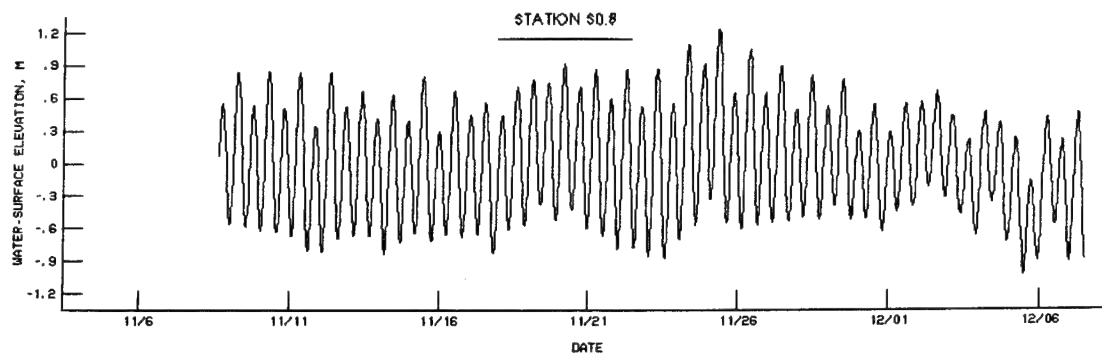
**SALINITY CONCENTRATION
STATIONS S7.0A AND S7.0B
04/30/93**



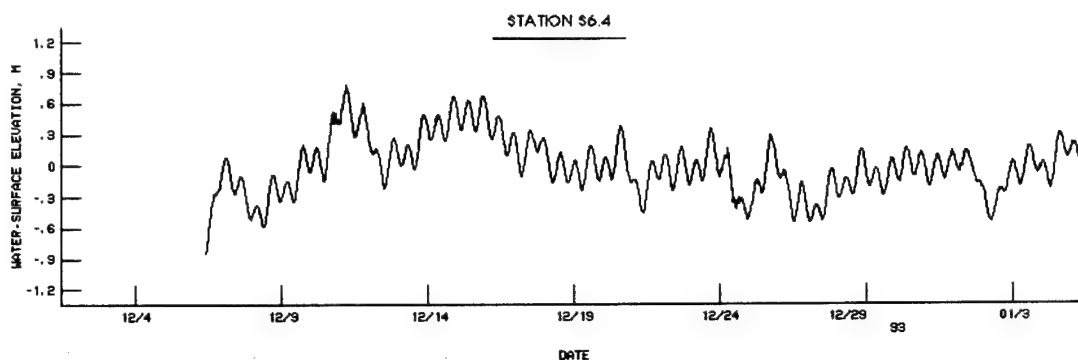
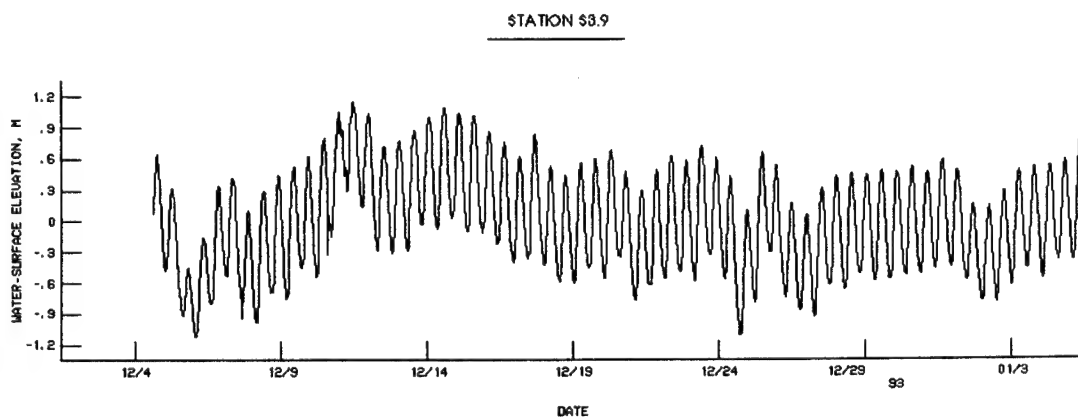
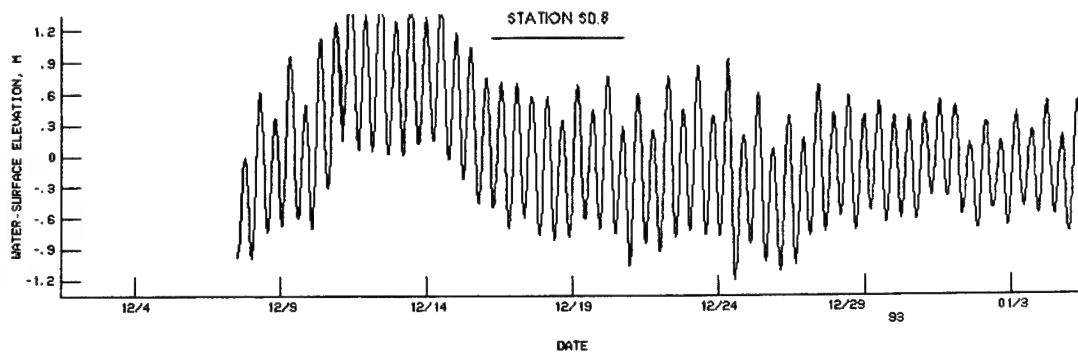
**WATER-SURFACE ELEVATION
STATIONS S0.8, S3.9, AND S6.4
10/05/92 - 10/26/92**



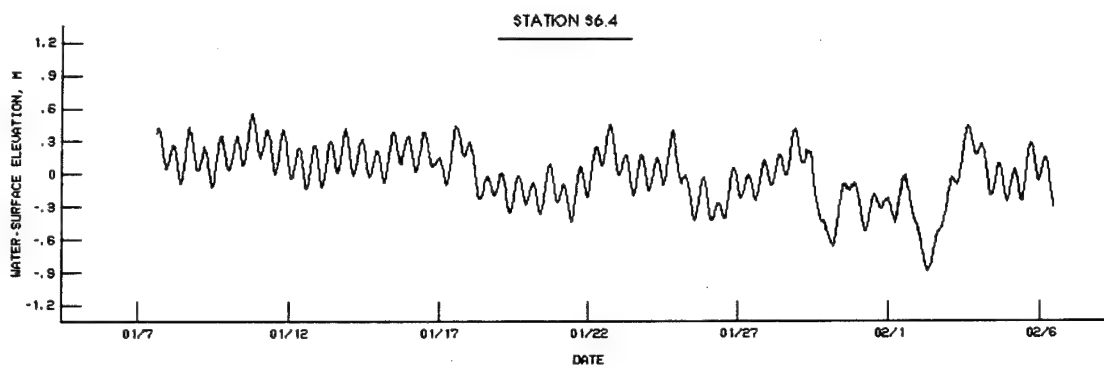
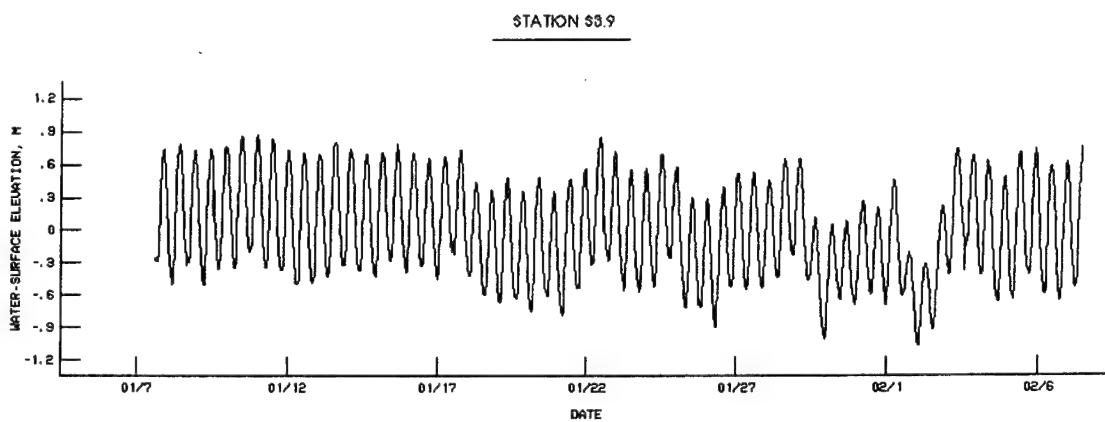
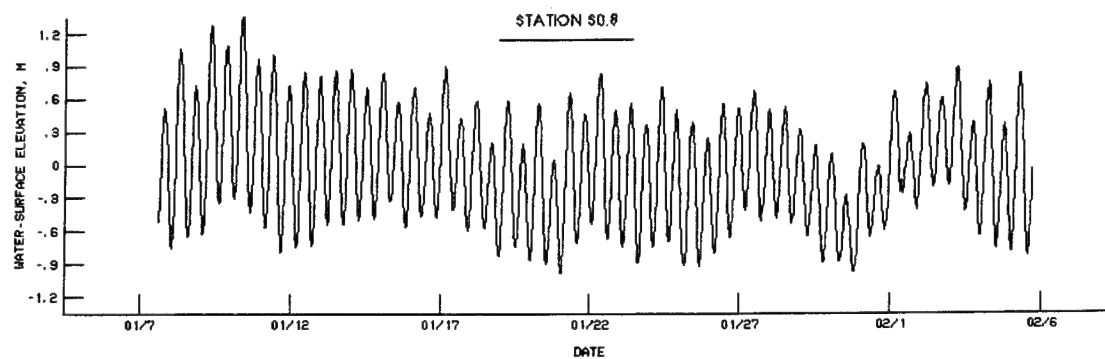
**WATER-SURFACE ELEVATION
STATIONS S0.8, S3.9, AND S6.4
10/25/92 - 11/08/92**



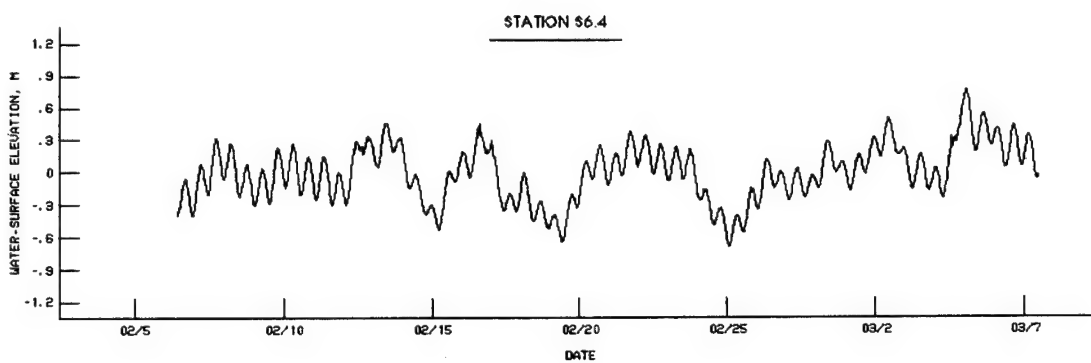
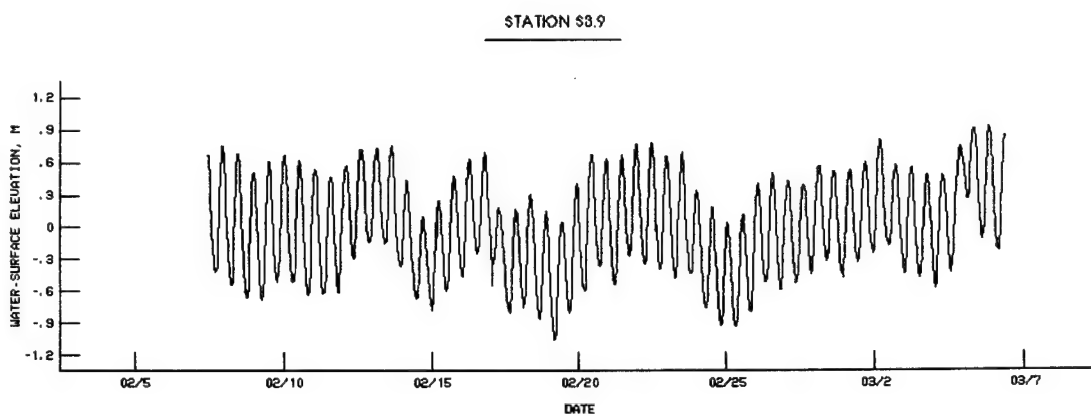
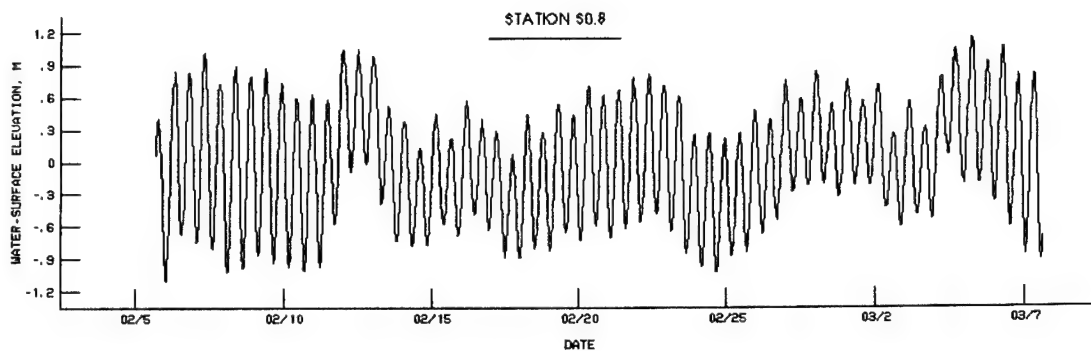
**WATER-SURFACE ELEVATION
STATIONS S0.8, S3.9, AND S6.4
11/06/92 - 12/07/92**



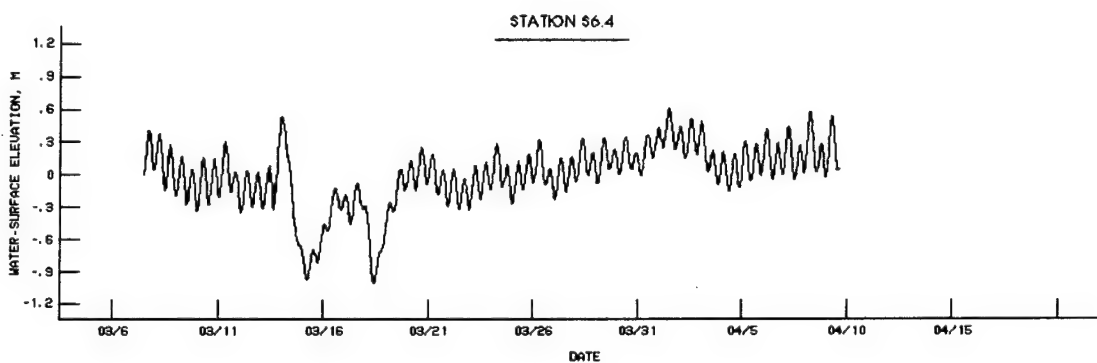
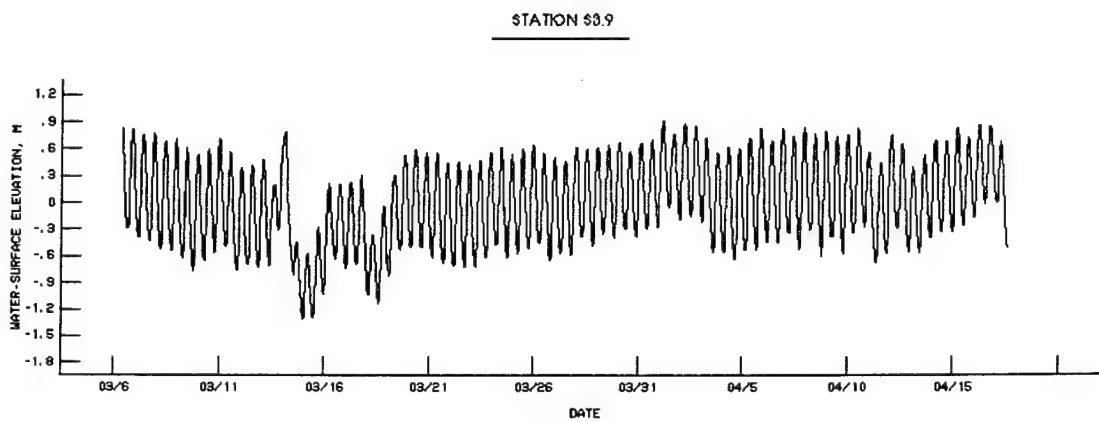
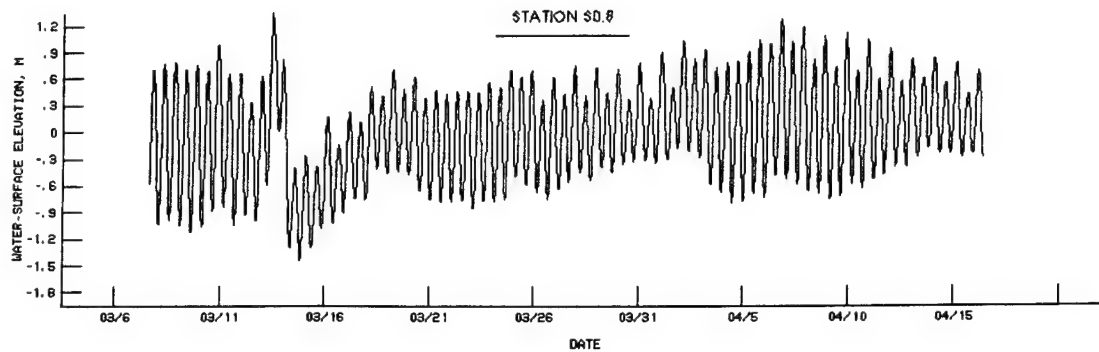
**WATER-SURFACE ELEVATION
STATIONS S0.8, S3.9, AND S6.4
12/04/92 - 01/07/93**



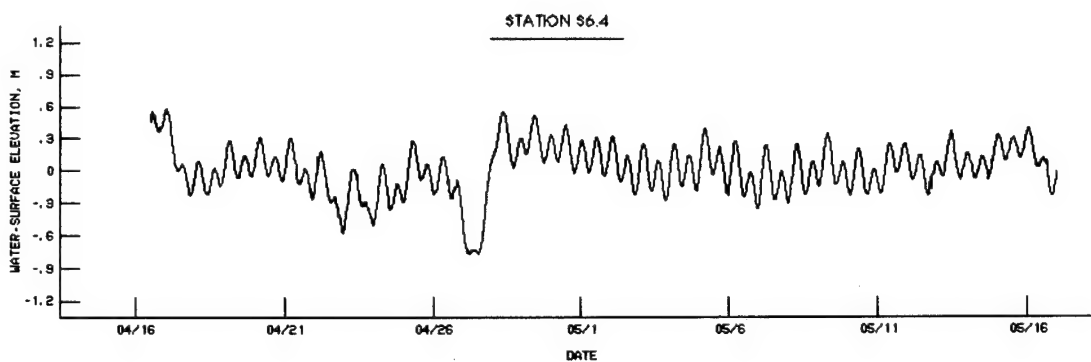
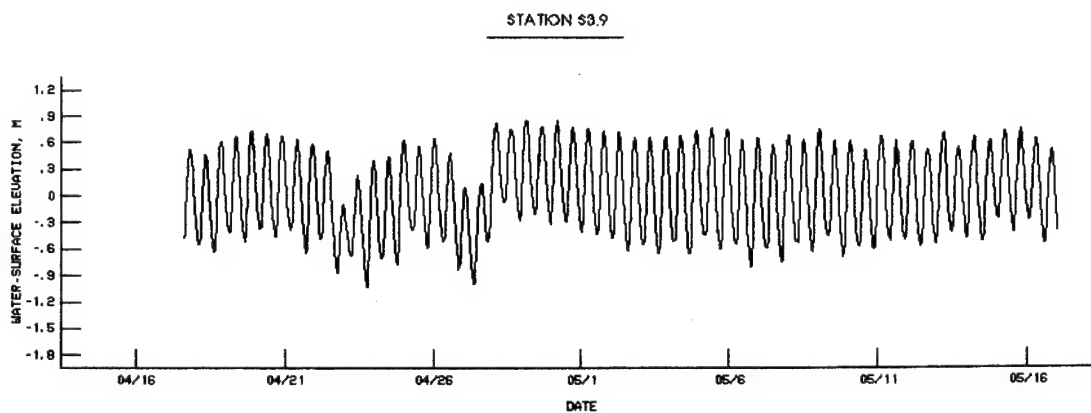
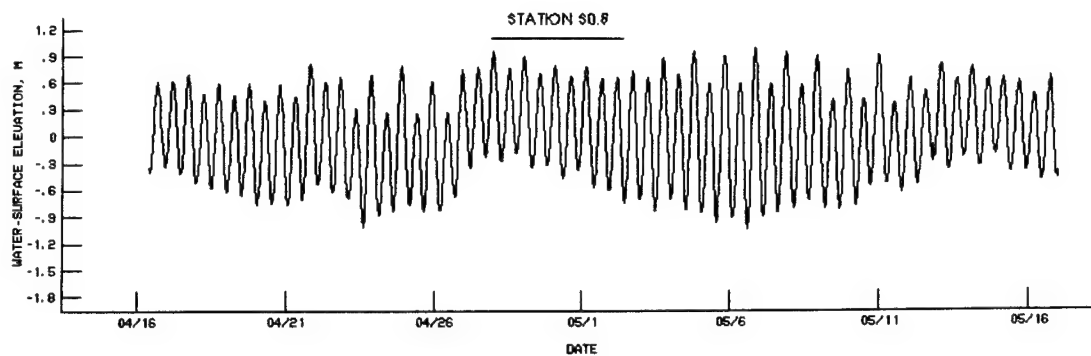
**WATER-SURFACE ELEVATION
STATIONS S0.8, S3.9, AND S6.4
01/07/93 - 02/07/93**



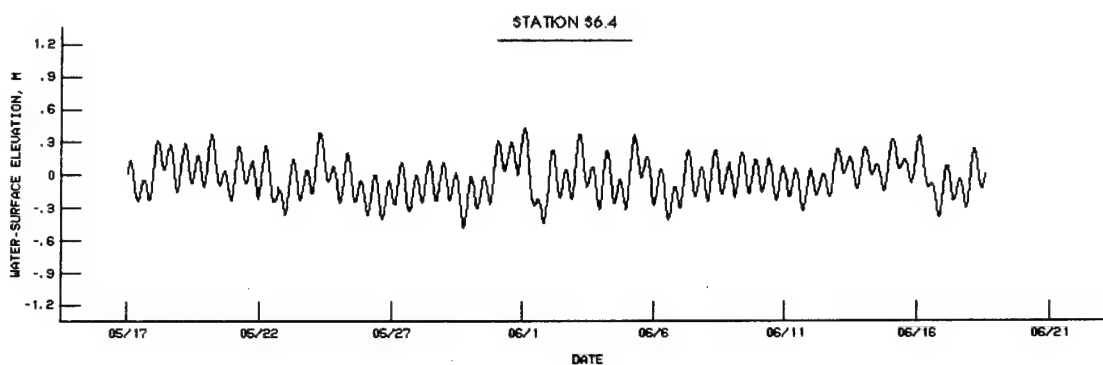
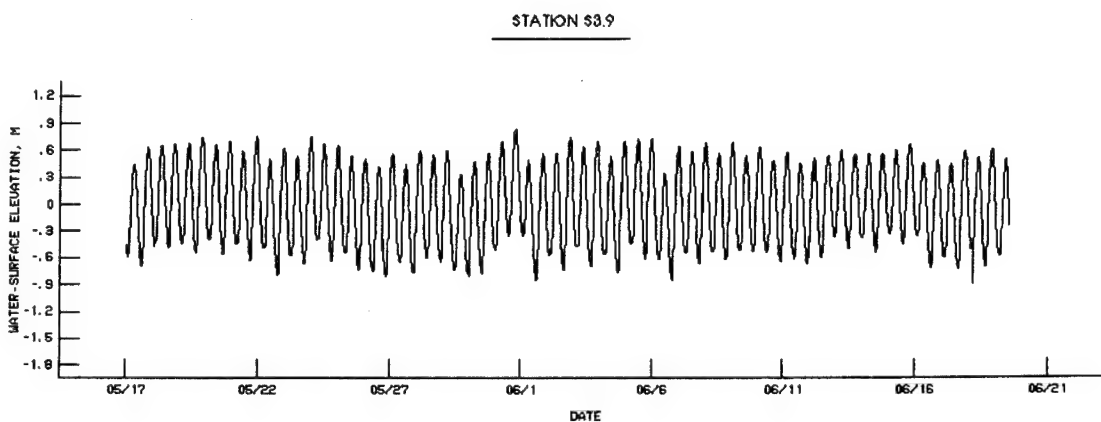
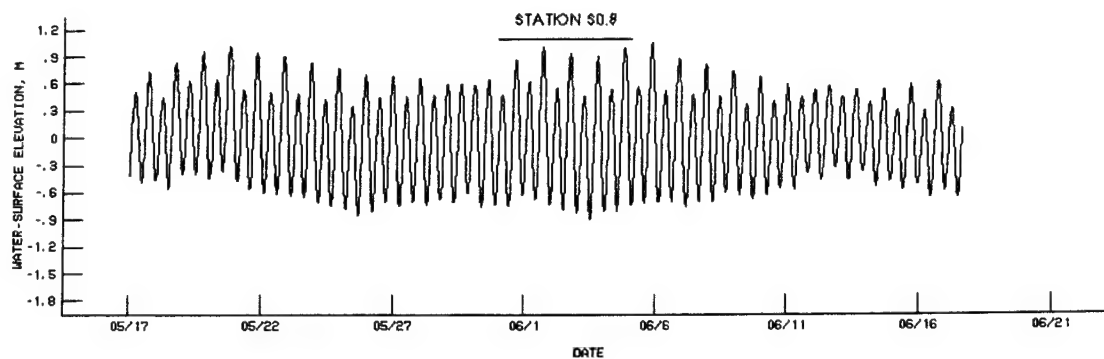
**WATER-SURFACE ELEVATION
STATIONS S0.8, S3.9, AND S6.4
02/05/93 - 03/07/93**



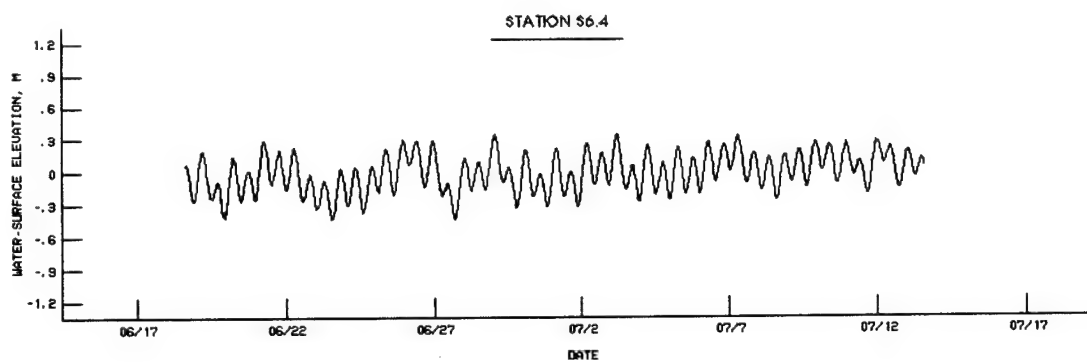
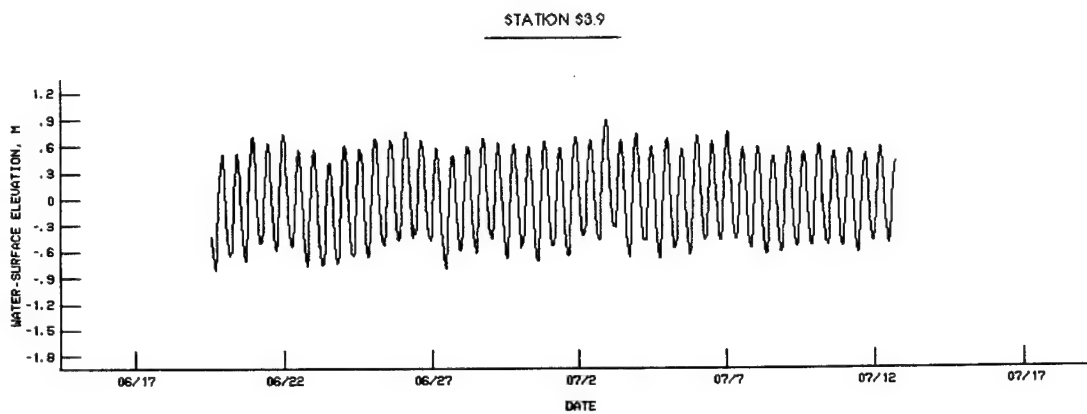
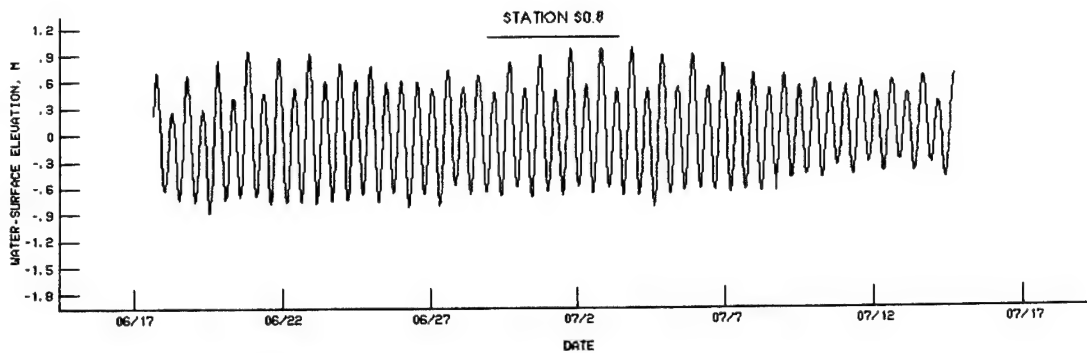
**WATER-SURFACE ELEVATION
STATIONS S0.8, S3.9, AND S6.4
03/06/93 - 04/17/93**



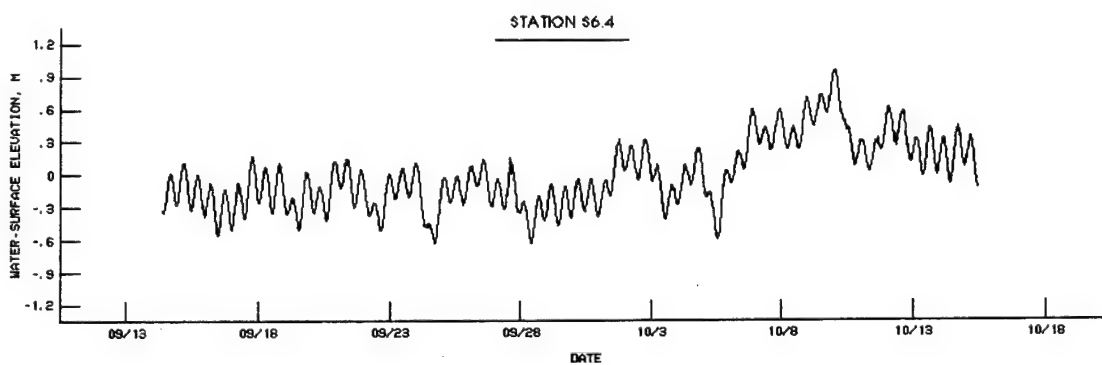
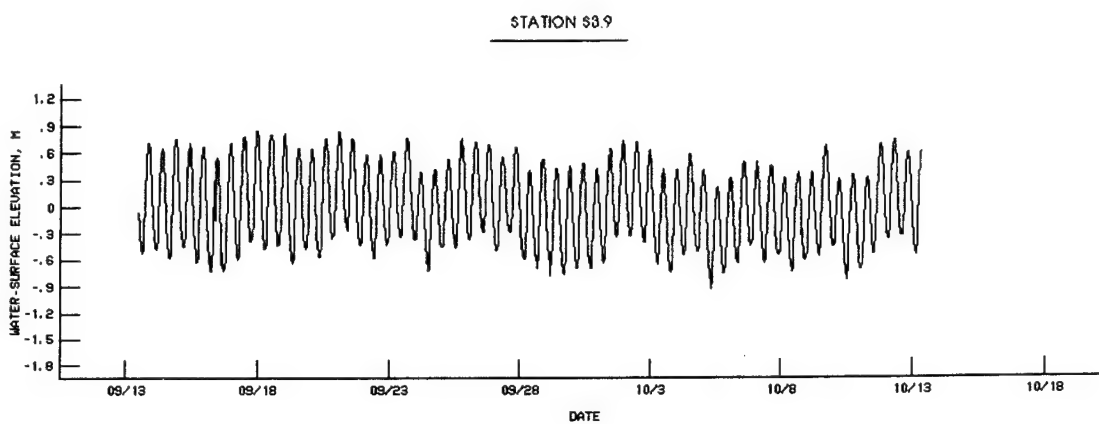
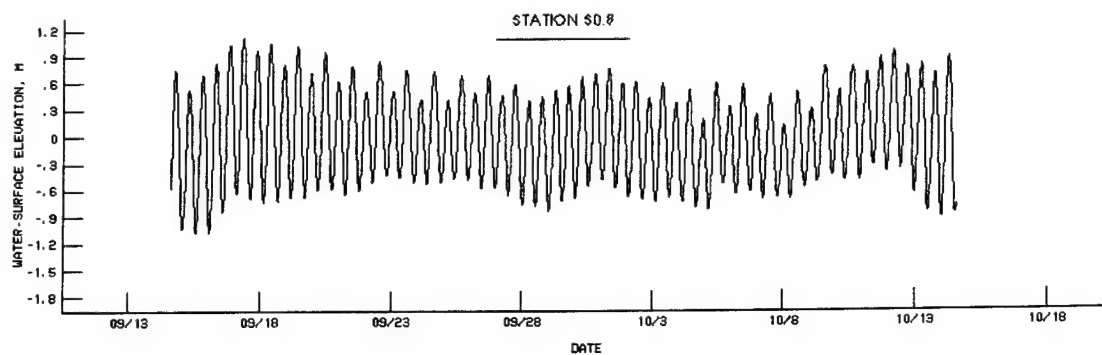
**WATER-SURFACE ELEVATION
STATIONS S0.8, S3.9, AND S6.4
04/16/93 - 05/17/93**



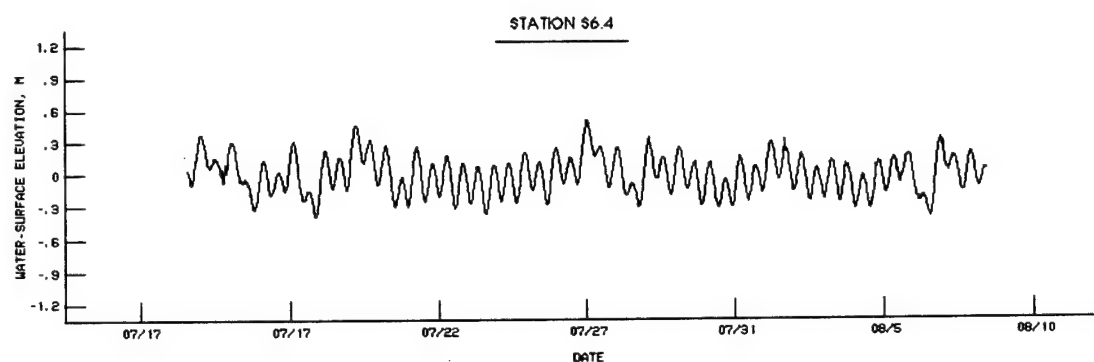
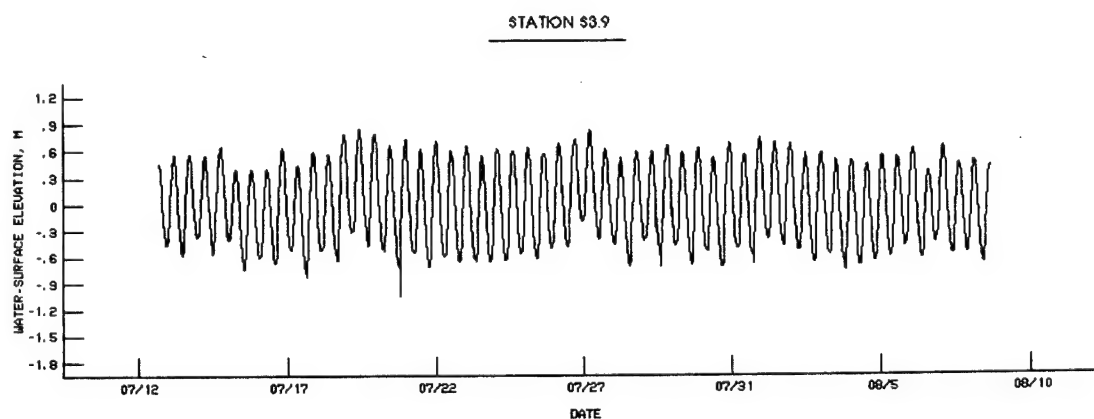
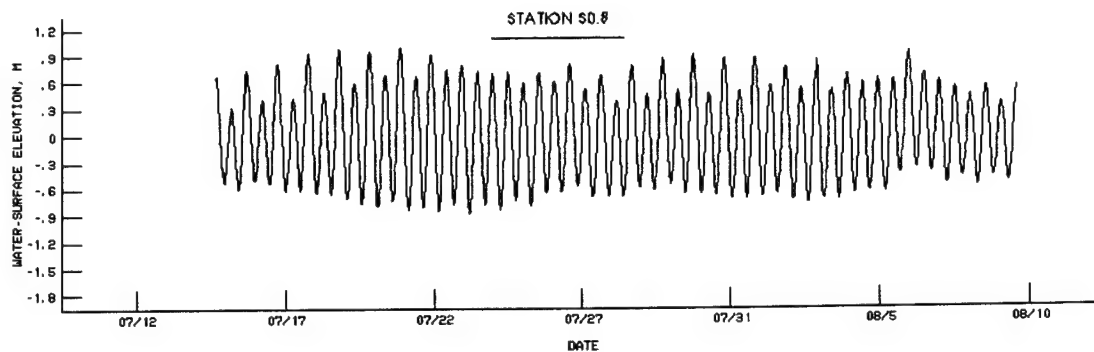
**WATER-SURFACE ELEVATION
STATIONS S0.8, S3.9, AND S6.4
05/17/93 - 06/19/93**



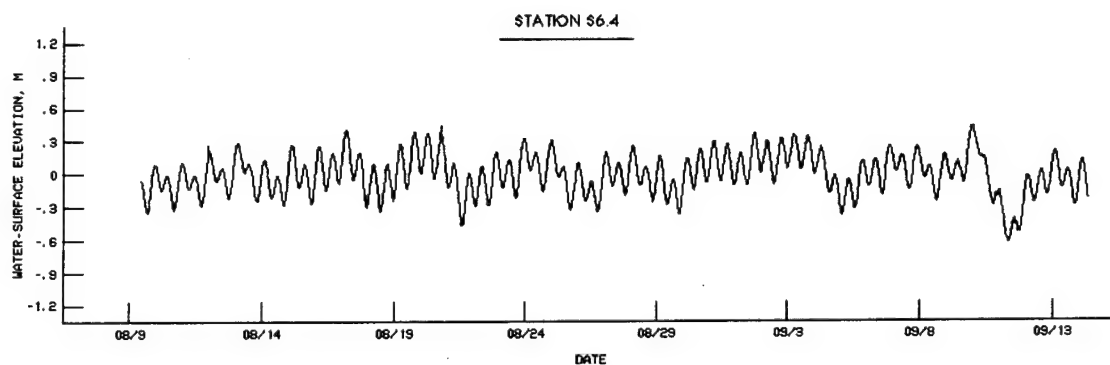
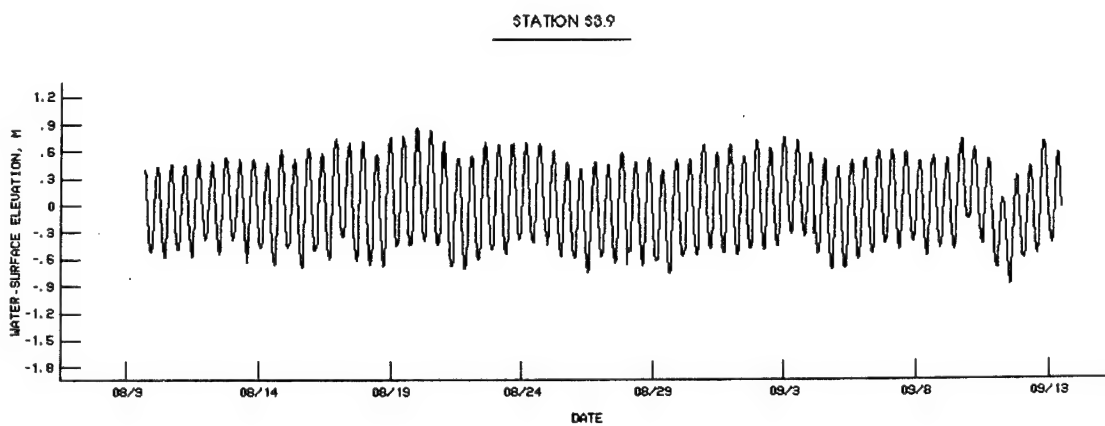
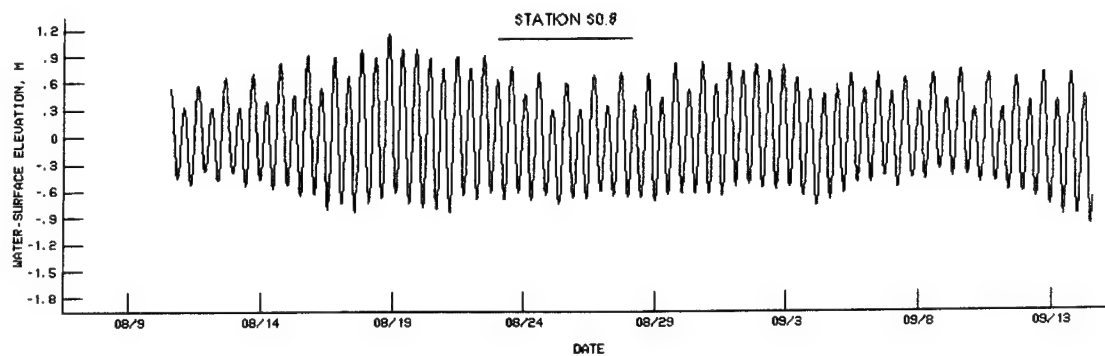
**WATER-SURFACE ELEVATION
STATIONS S0.8, S3.9, AND S6.4
06/17/93 - 07/17/93**



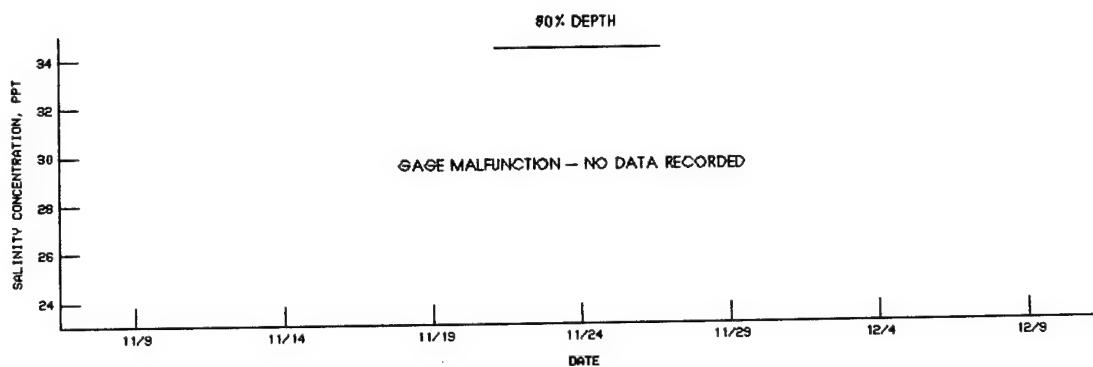
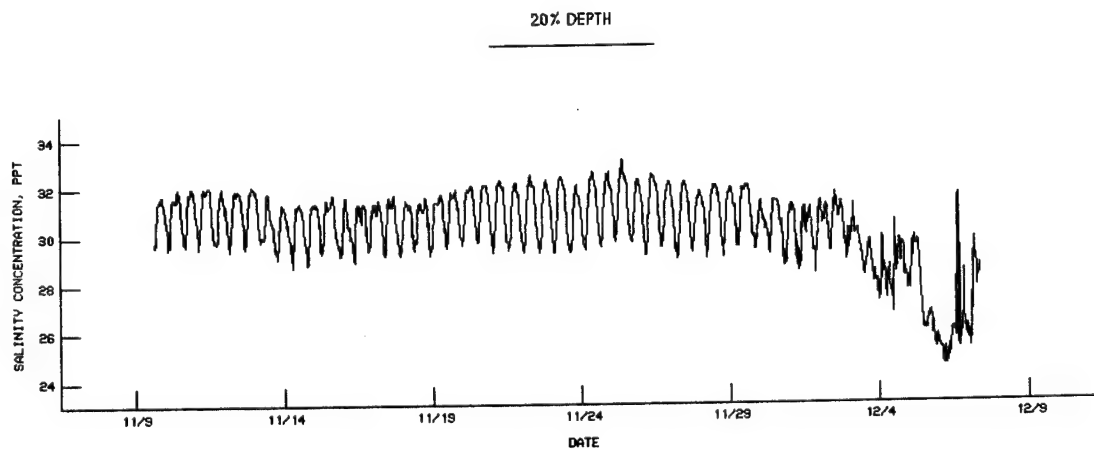
**WATER-SURFACE ELEVATION
STATIONS S0.8, S3.9, AND S6.4
09/13/93 - 10/15/93**



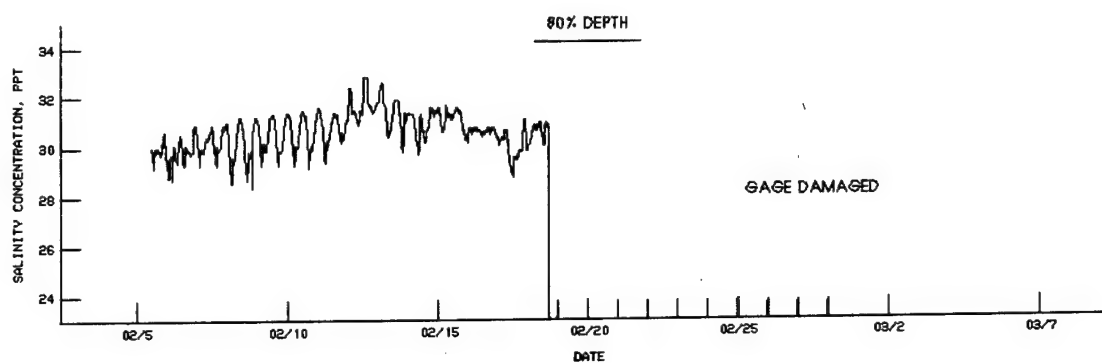
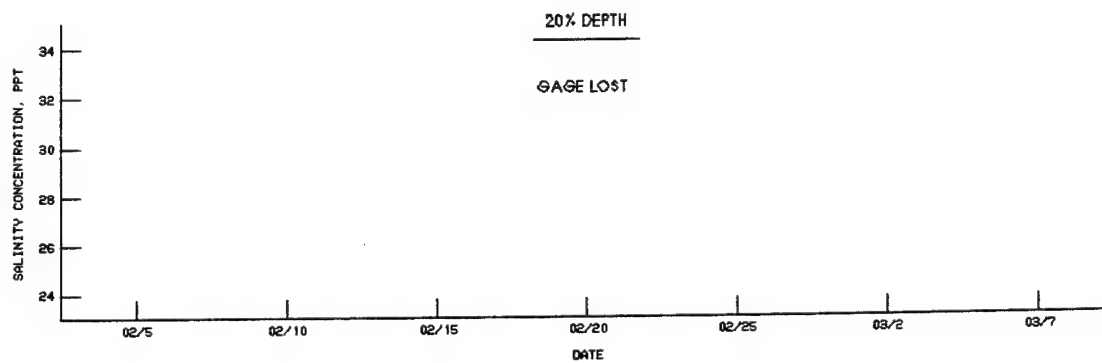
**WATER-SURFACE ELEVATION
STATIONS S0.8, S3.9, AND S6.4
07/12/93 - 08/10/93**



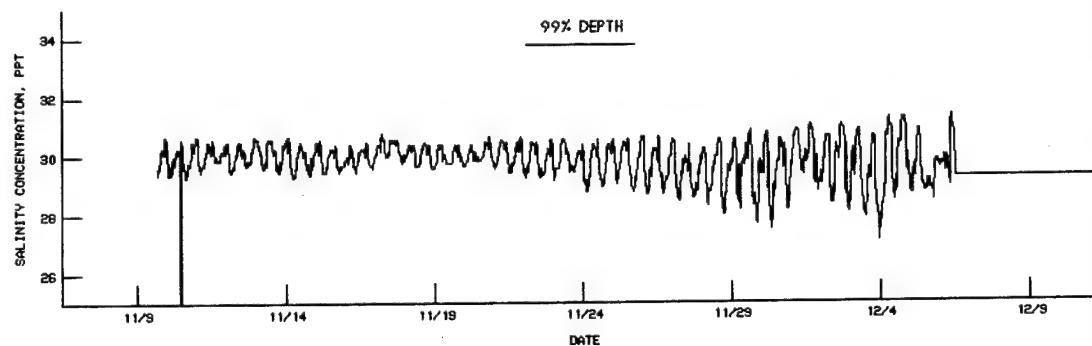
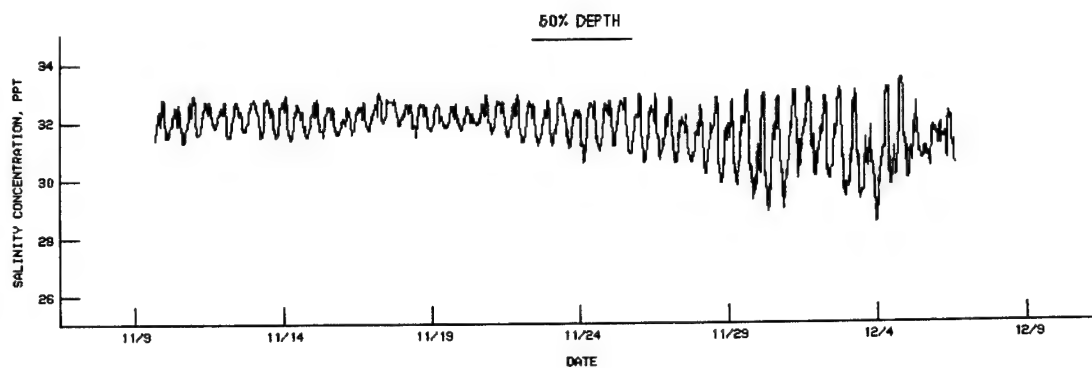
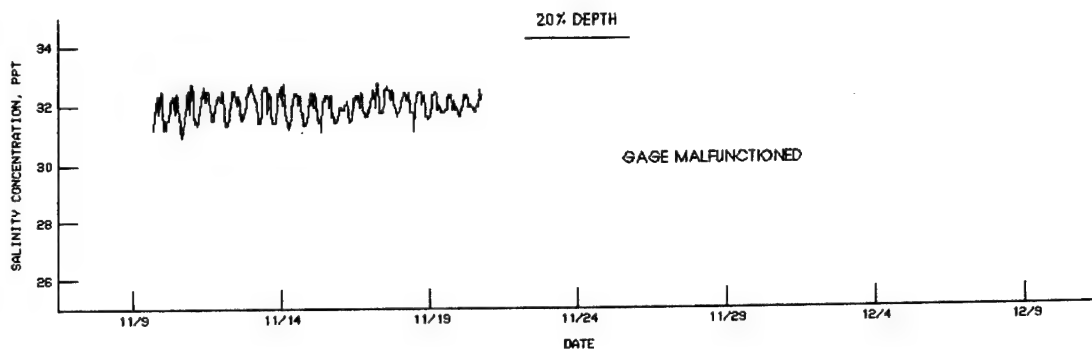
**WATER-SURFACE ELEVATION
STATIONS S0.8, S3.9, AND S6.4
08/09/93 - 09/14/93**



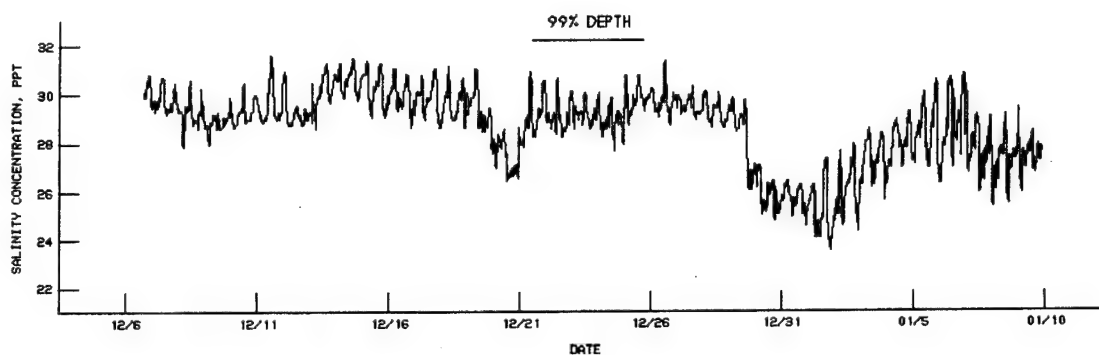
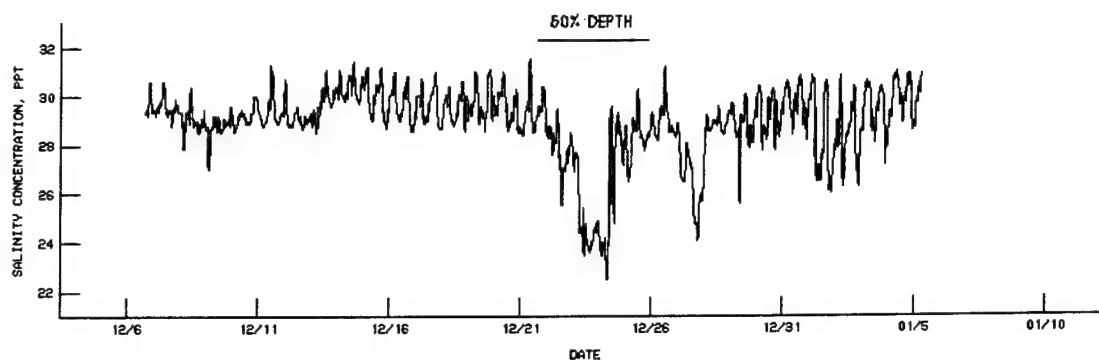
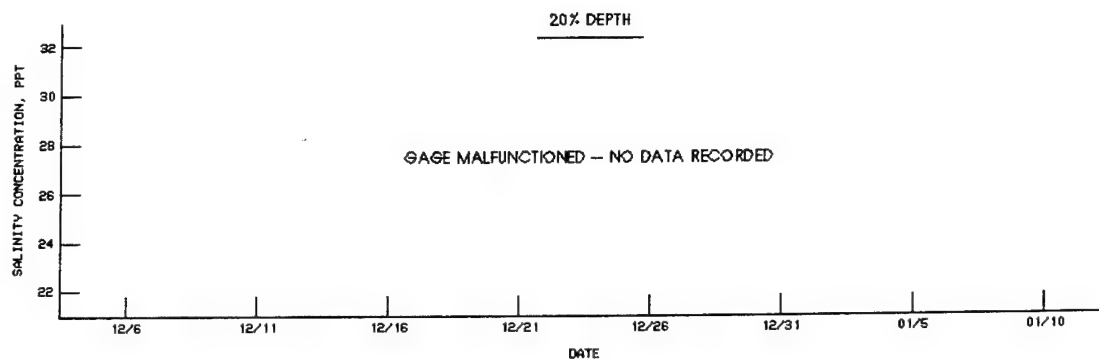
SALINITY CONCENTRATION
STATION S12
20% AND 80% DEPTHS
11/09/92 - 12/07/92



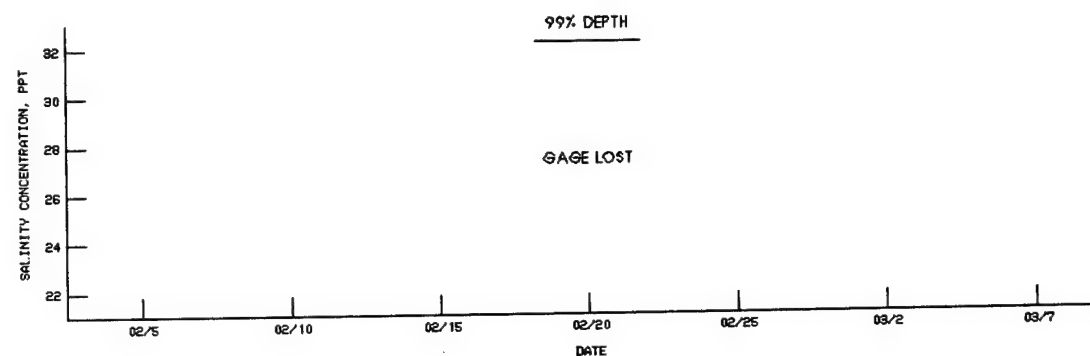
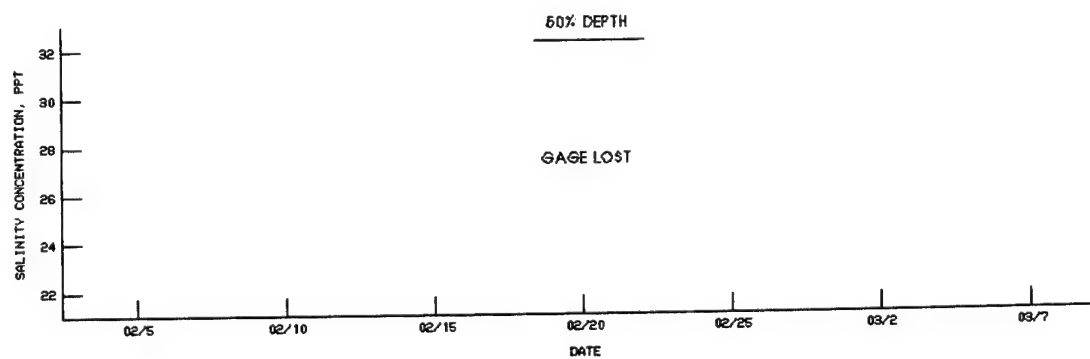
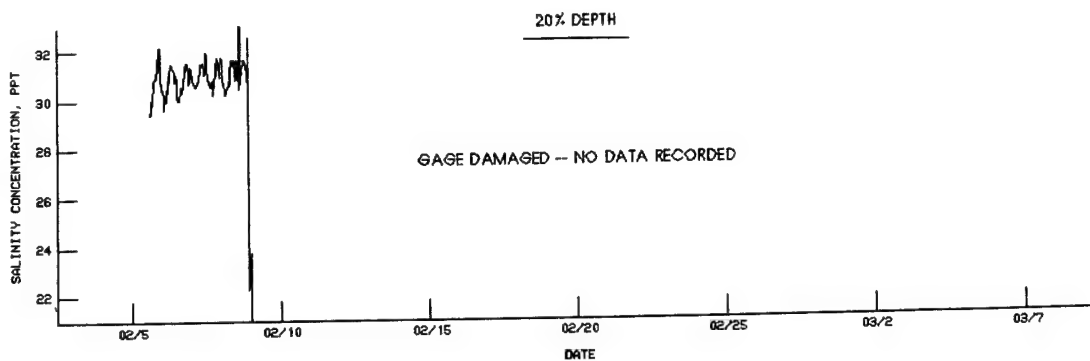
SALINITY CONCENTRATION
STATION S1.2
20% AND 80% DEPTHS
02/05/93 - 03/05/93



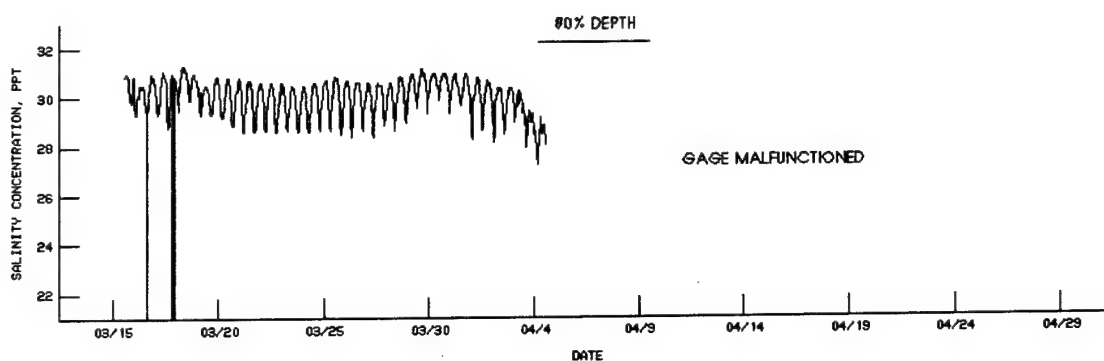
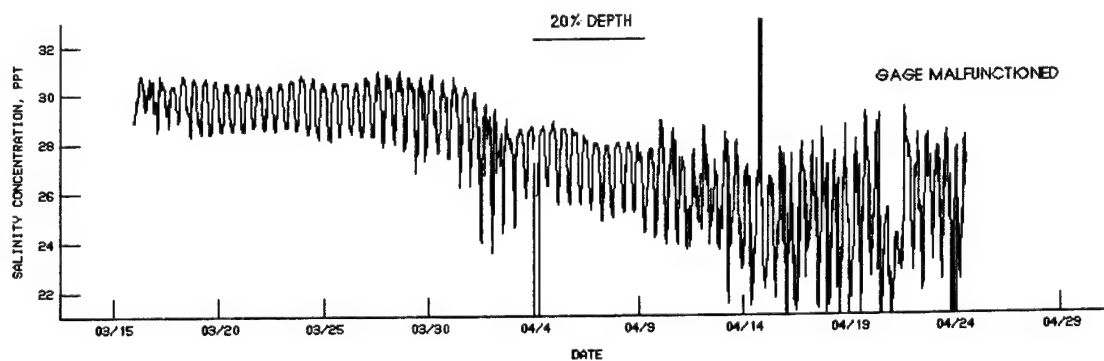
SALINITY CONCENTRATION
STATION S1.3
20%, 50%, AND 99% DEPTHS
11/09/92 - 12/06/92



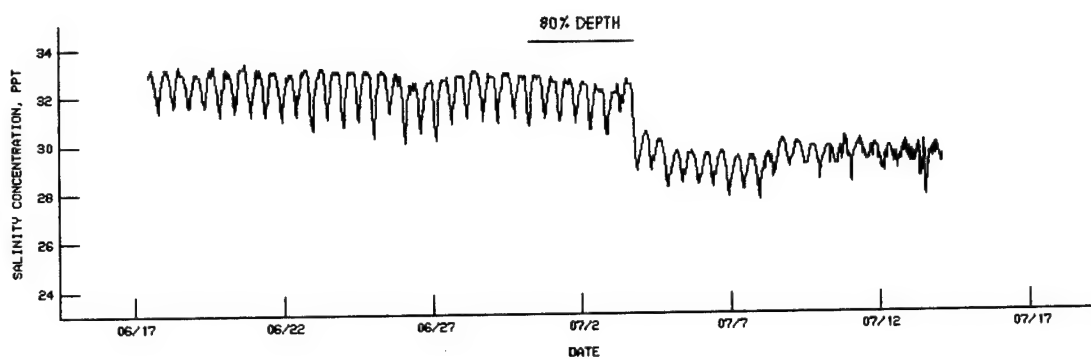
SALINITY CONCENTRATION
STATION S1.3
20%, 50%, AND 99% DEPTHS
12/06/92 - 01/09/93



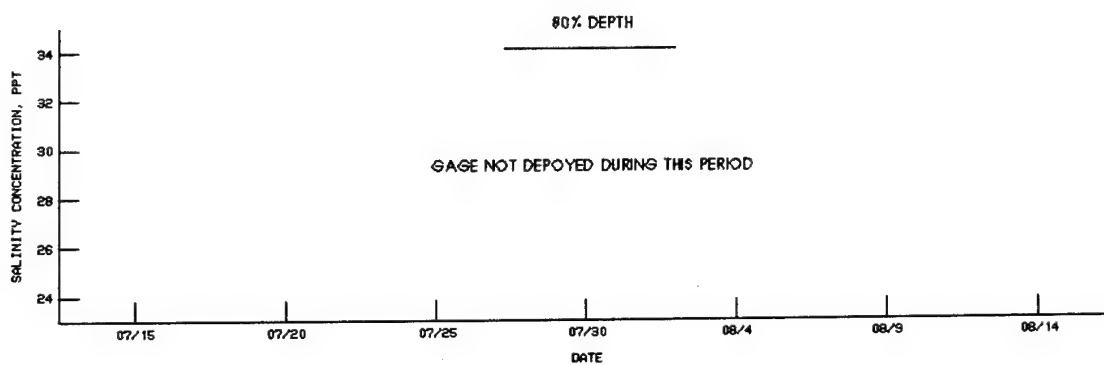
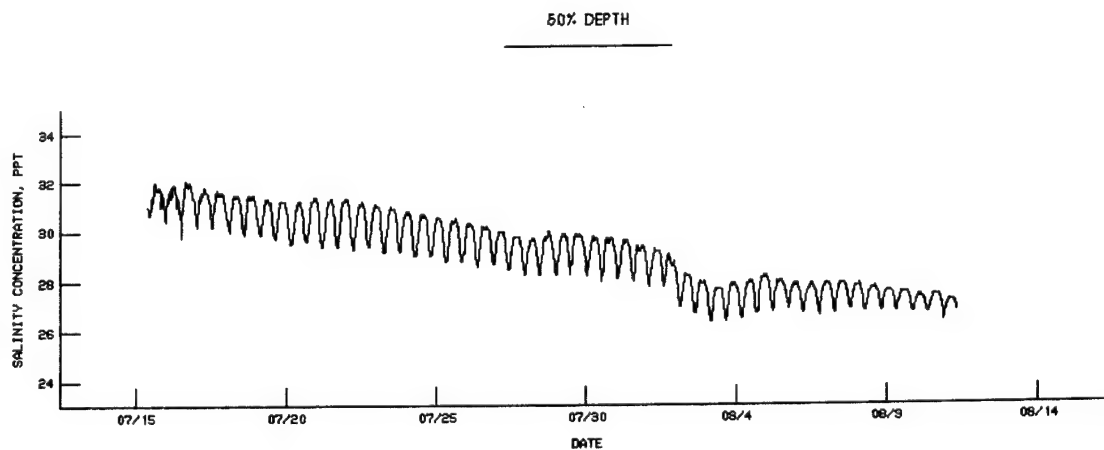
SALINITY CONCENTRATION
STATION S1.3
20%, 50%, AND 99% DEPTHS
02/05/92 - 03/05/93



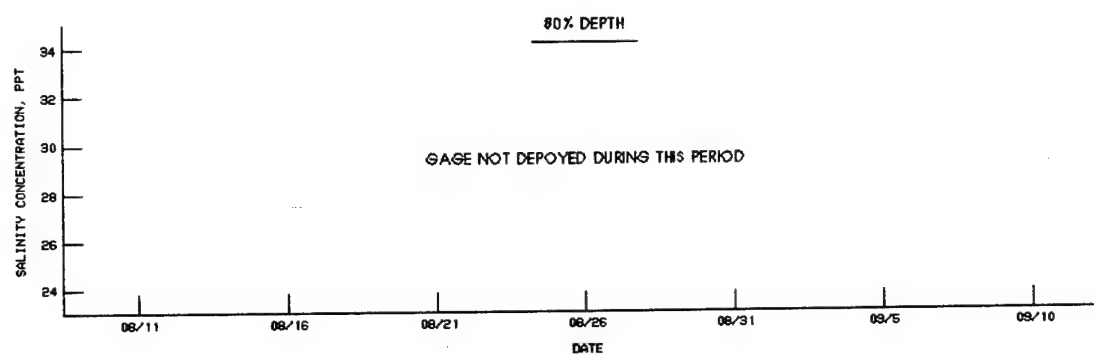
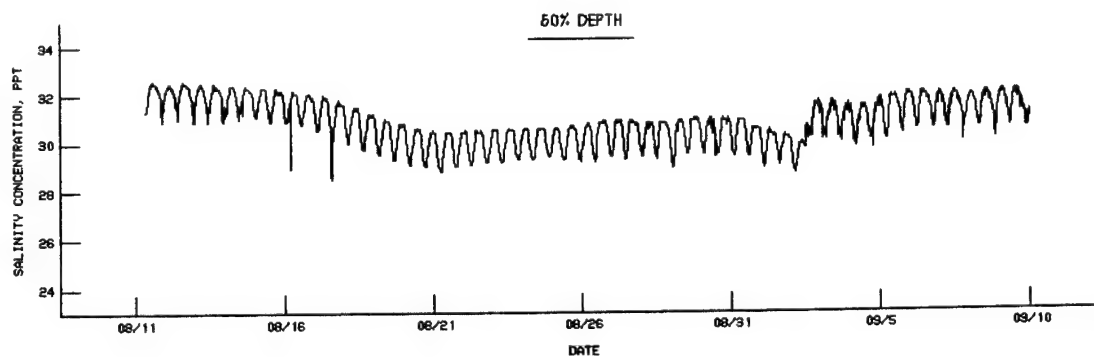
**SALINITY CONCENTRATION
STATION S1.4
20% AND 80% DEPTHS
03/15/93 - 04/30/93**



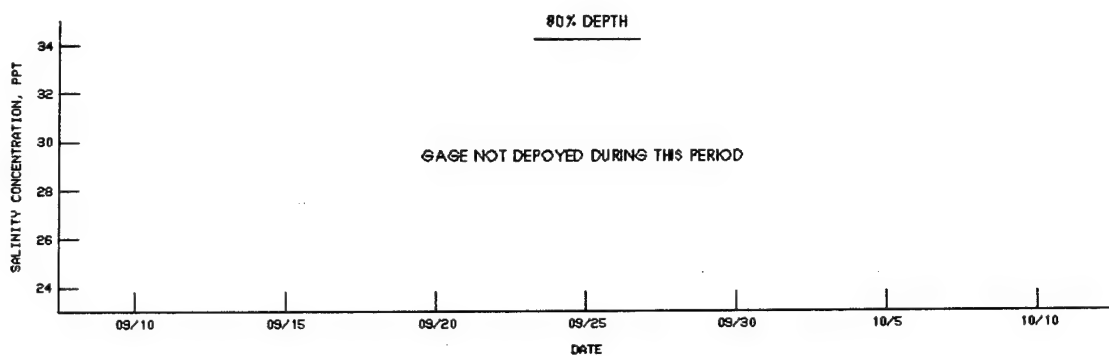
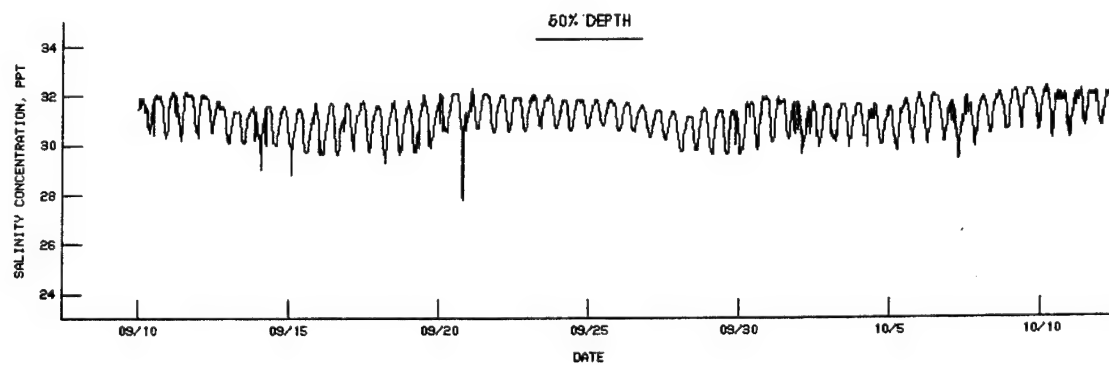
SALINITY CONCENTRATION
STATION S1.4
20% AND 80% DEPTHS
06/17/93 - 07/14/93



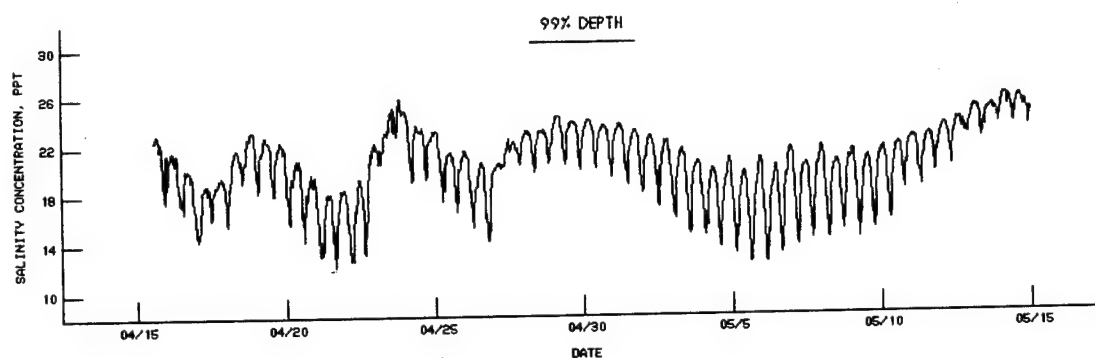
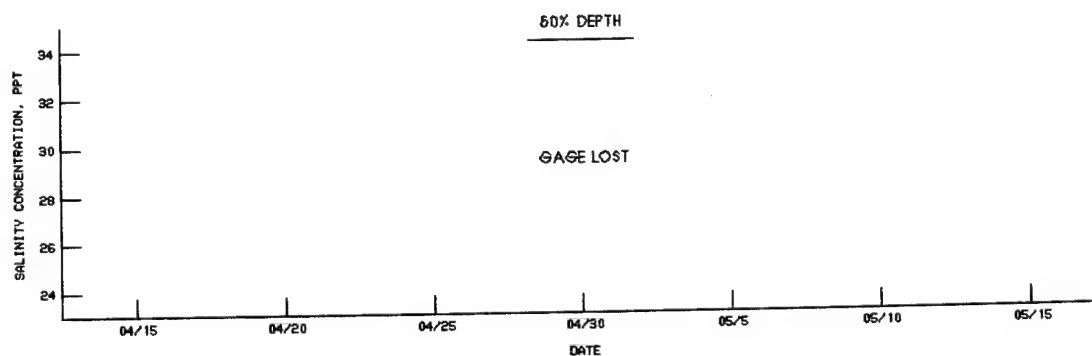
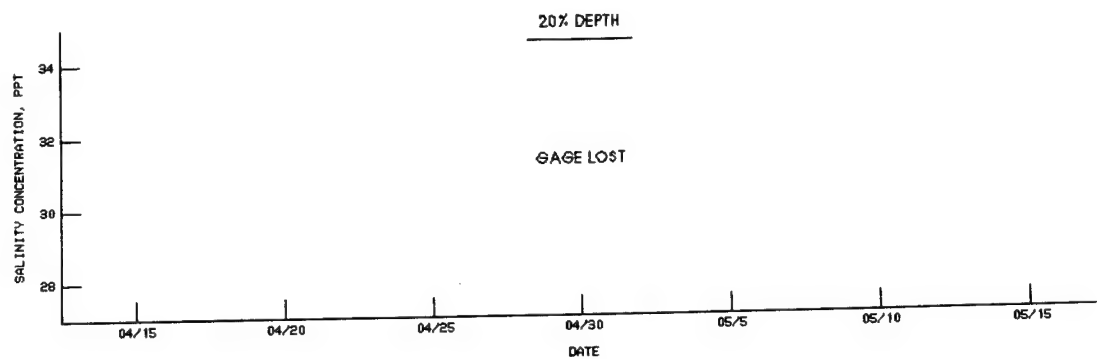
SALINITY CONCENTRATION
STATION S1.4
50% AND 80% DEPTHS
07/15/93 - 08/11/93



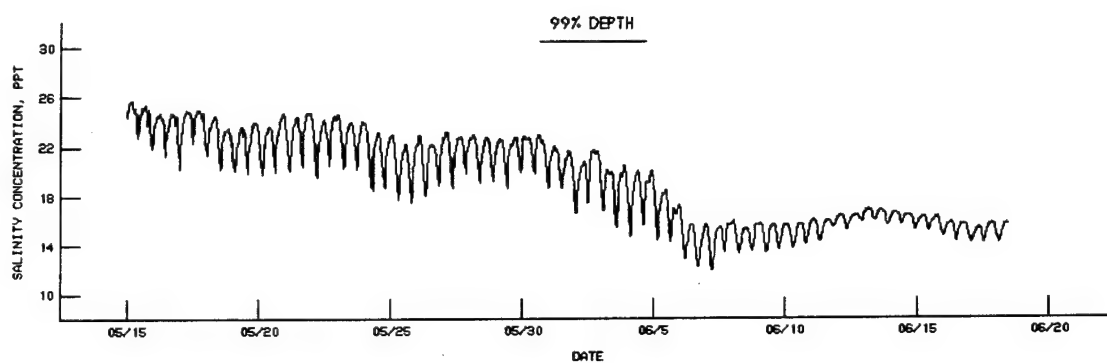
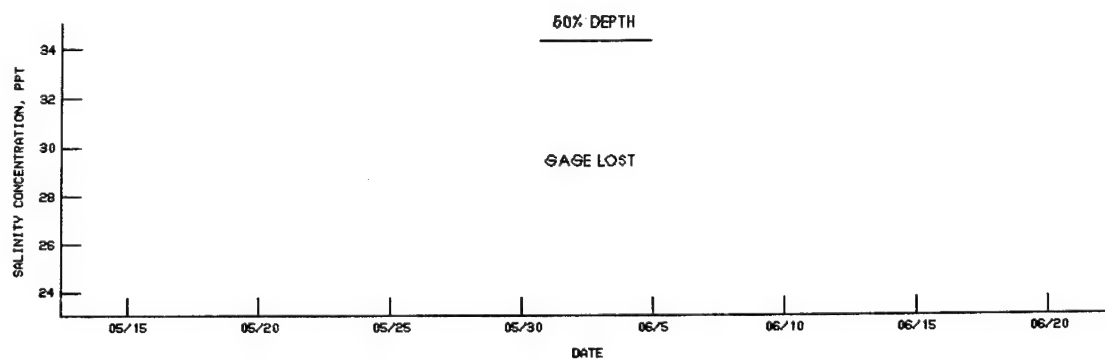
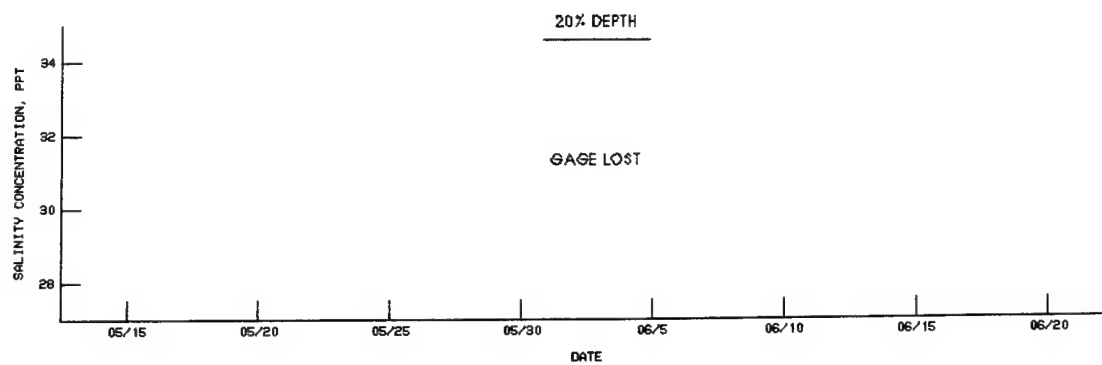
SALINITY CONCENTRATION
STATION S1.4
50% AND 80% DEPTHS
08/11/93 - 09/10/93



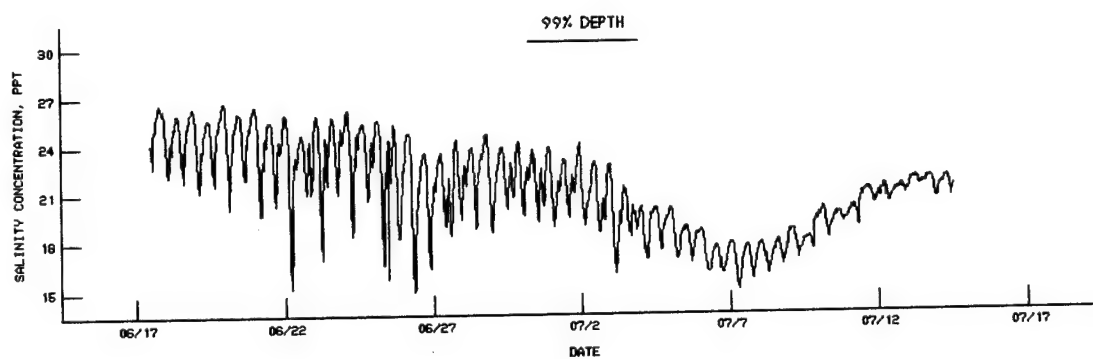
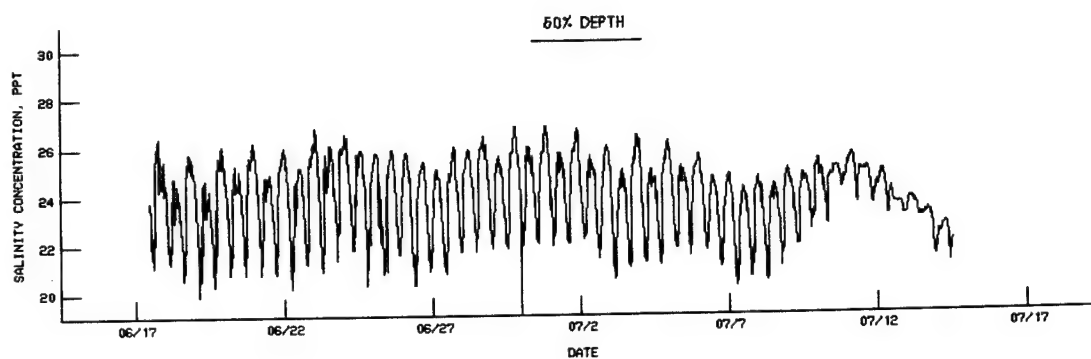
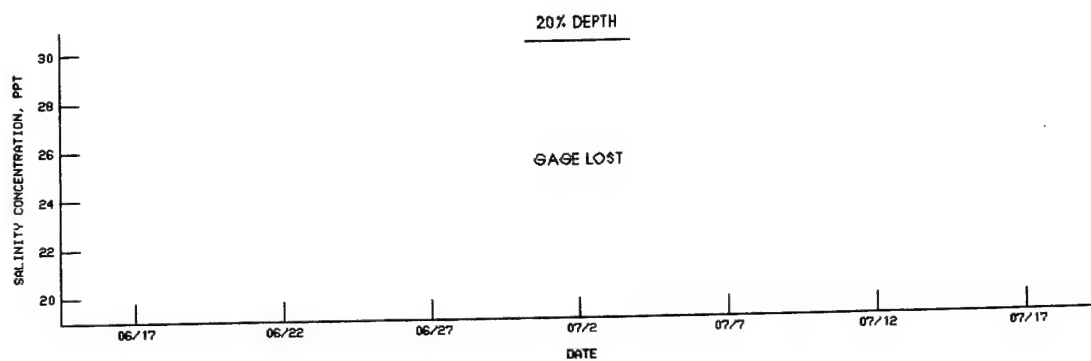
SALINITY CONCENTRATION
STATION S1.4
50% AND 80% DEPTHS
09/10/93 - 10/21/93



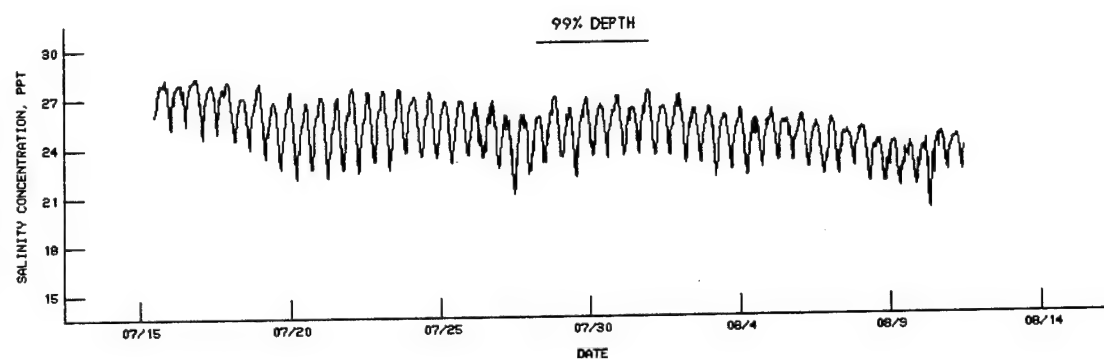
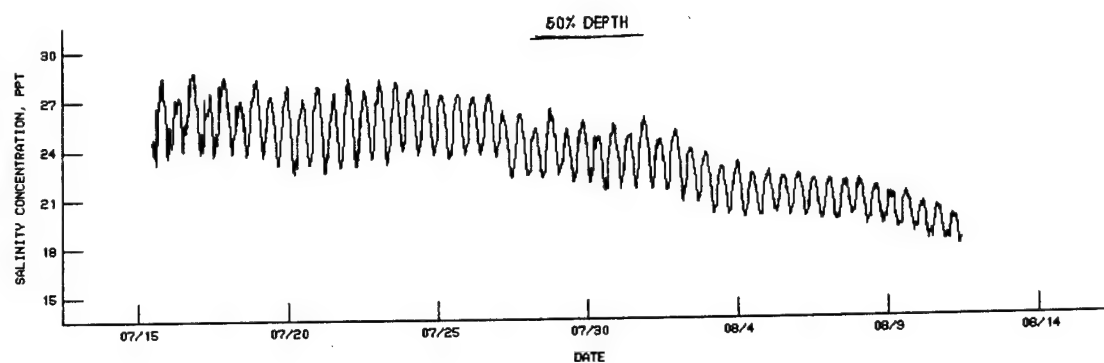
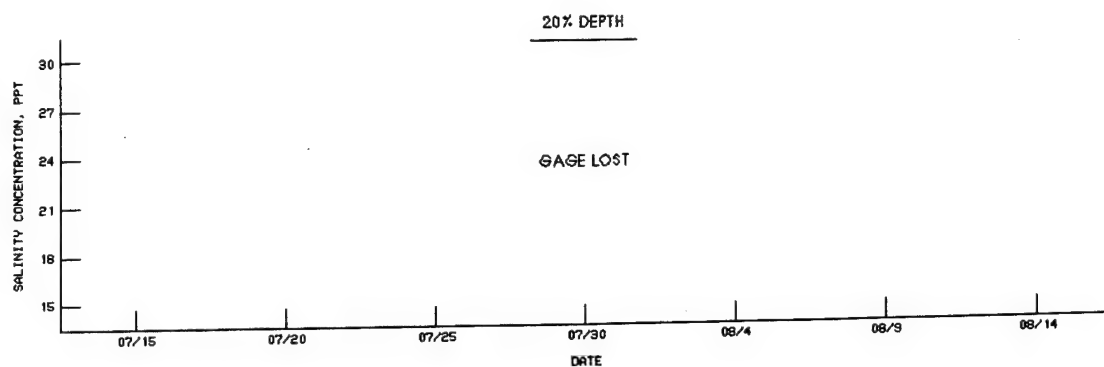
SALINITY CONCENTRATION
STATION S1.8
20%, 50%, AND 99% DEPTHS
04/15/93 - 05/15/93



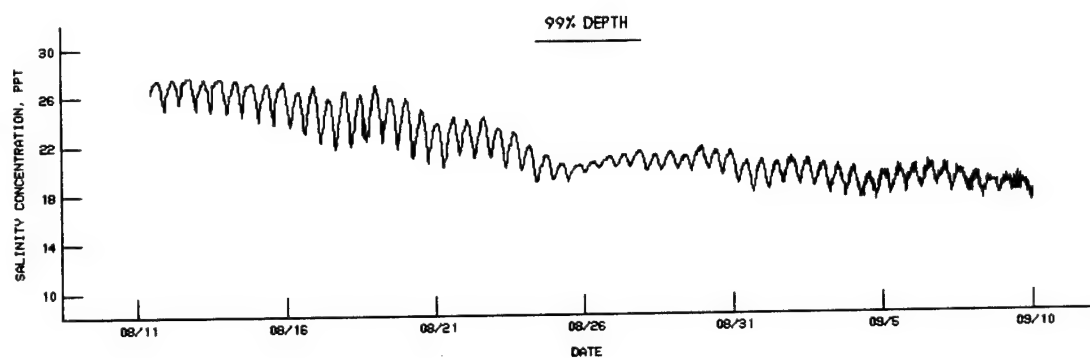
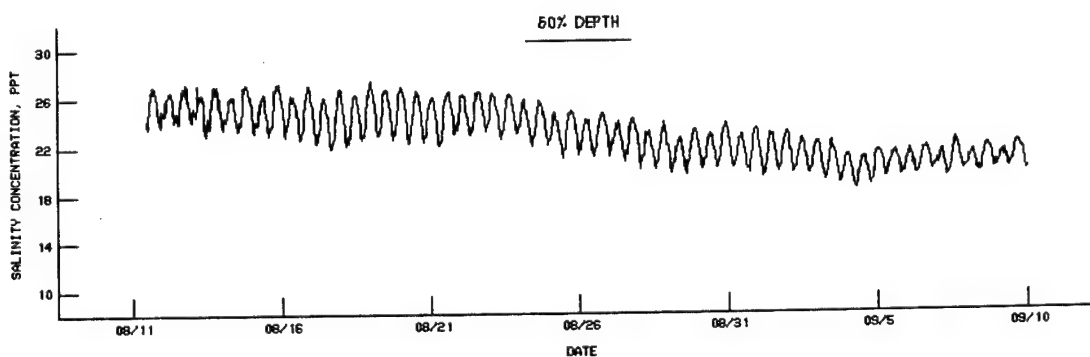
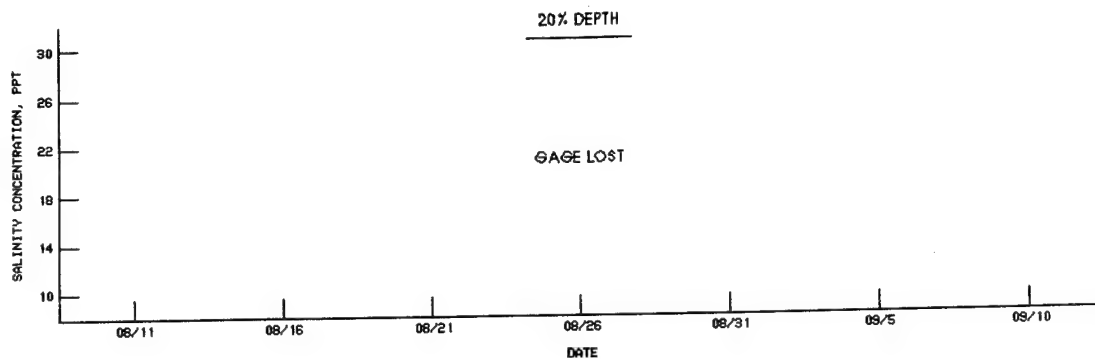
SALINITY CONCENTRATION
STATION S1.8
20%, 50%, AND 99% DEPTHS
05/15/93 - 06/17/93



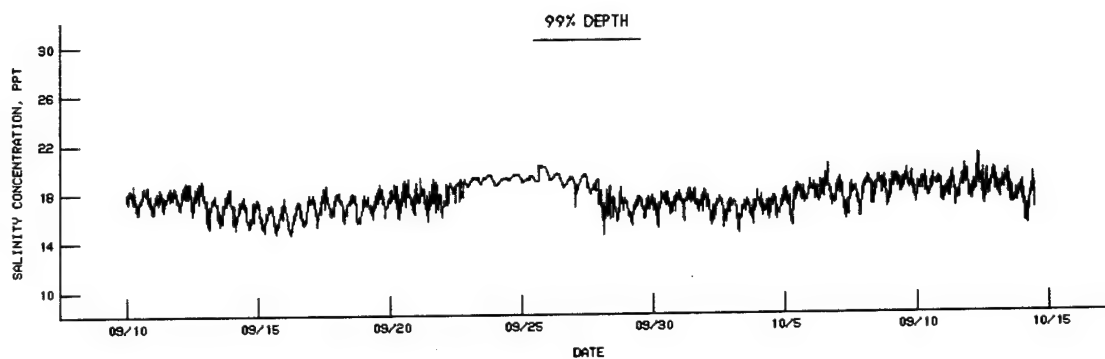
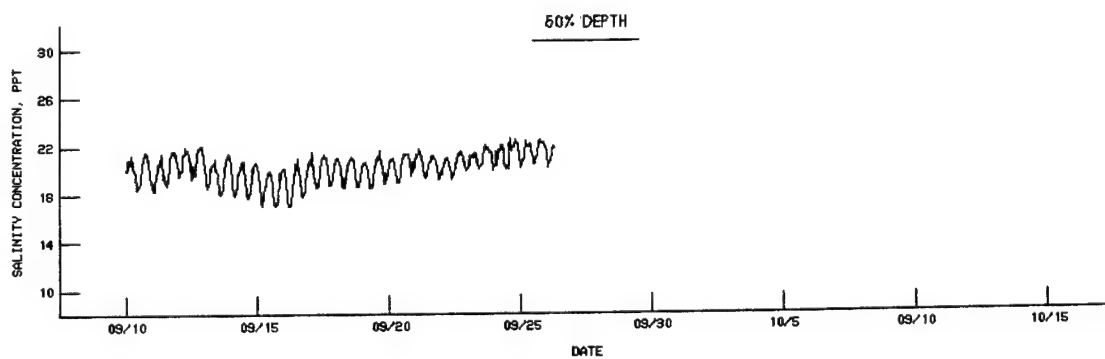
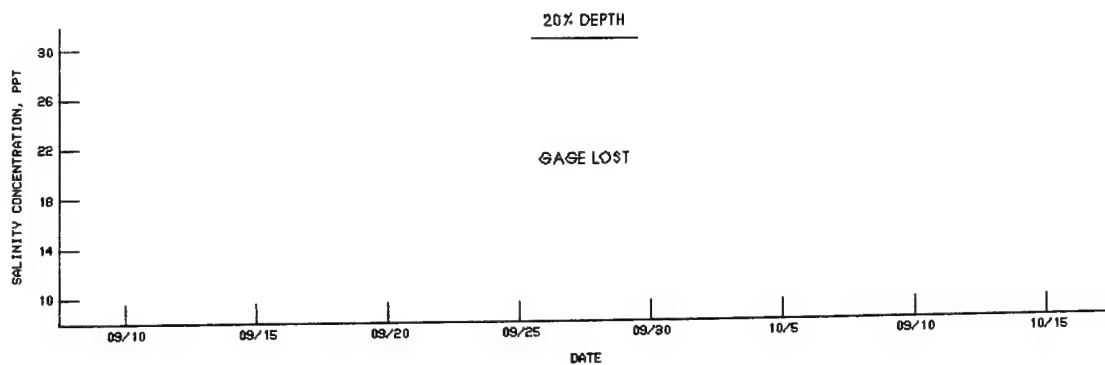
SALINITY CONCENTRATION
STATION S1.8
20%, 50%, AND 99% DEPTHS
06/17/93 - 07/14/93



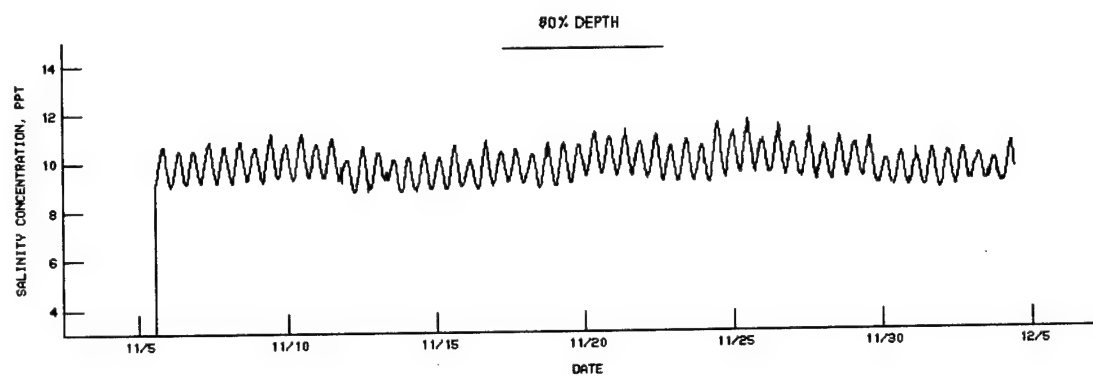
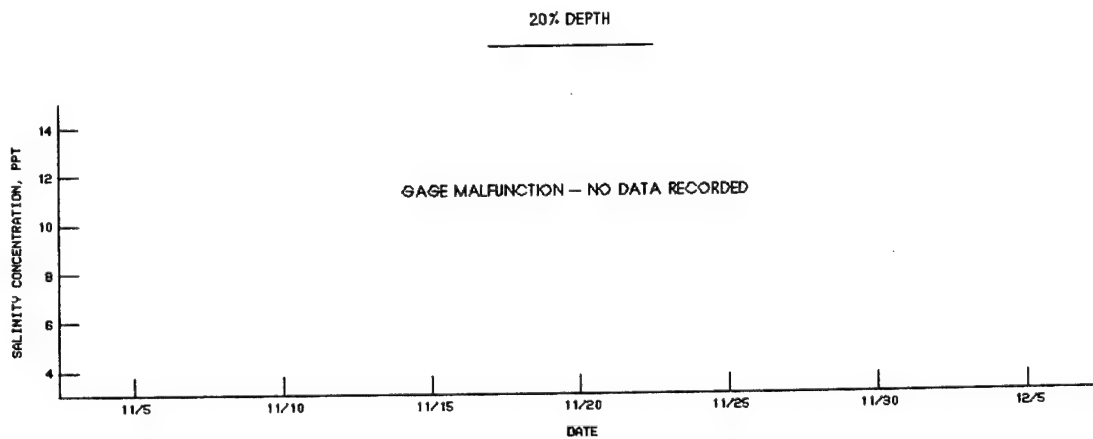
SALINITY CONCENTRATION
STATION S1.8
20%, 50%, AND 99% DEPTHS
07/15/93 - 08/11/93



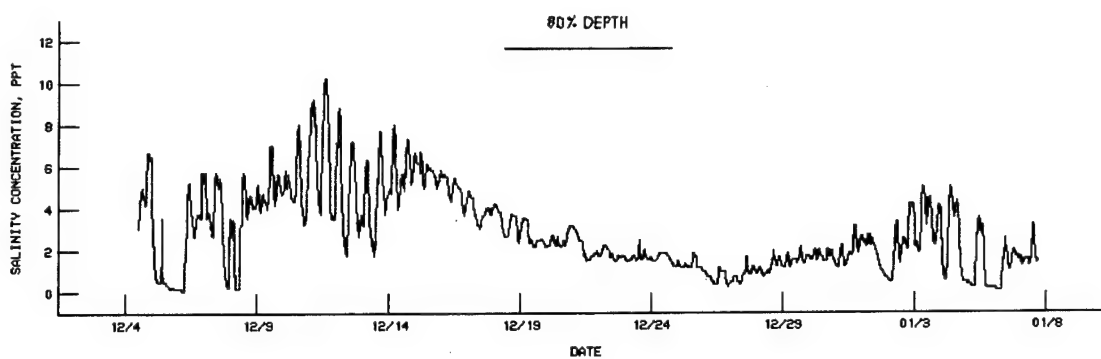
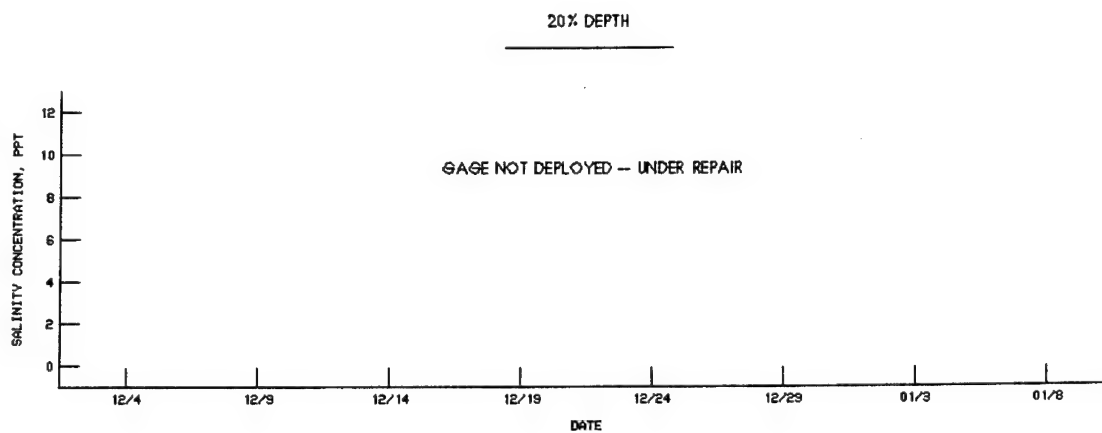
SALINITY CONCENTRATION
STATION S1.8
20%, 50%, AND 99% DEPTHS
08/11/93 - 09/10/93



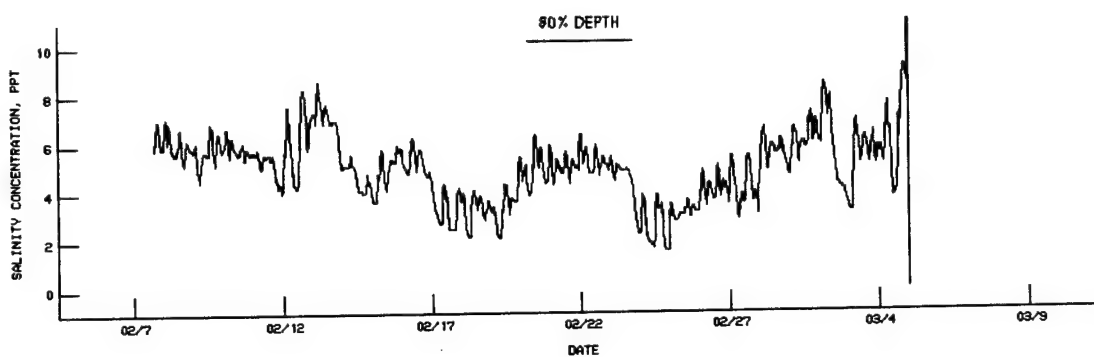
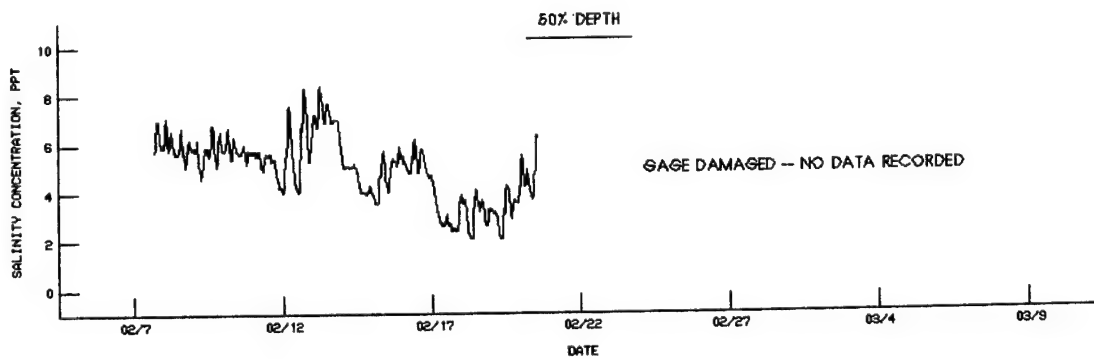
SALINITY CONCENTRATION
STATION S1.8
20%, 50%, AND 99% DEPTHS
09/10/93 - 10/14/93



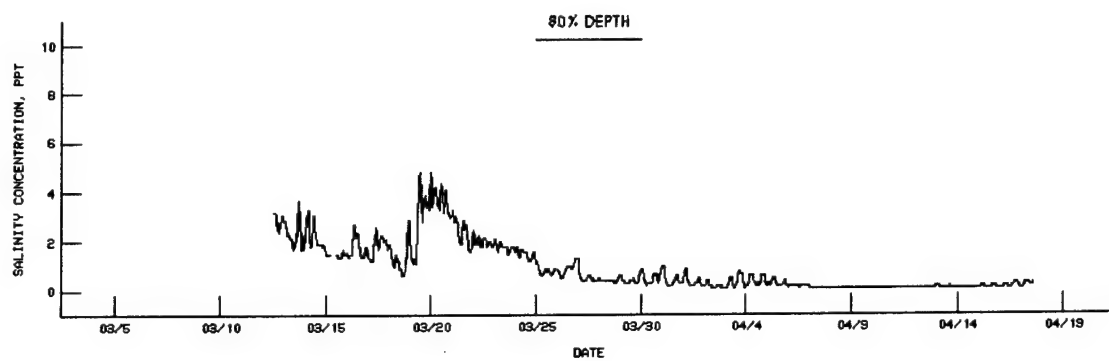
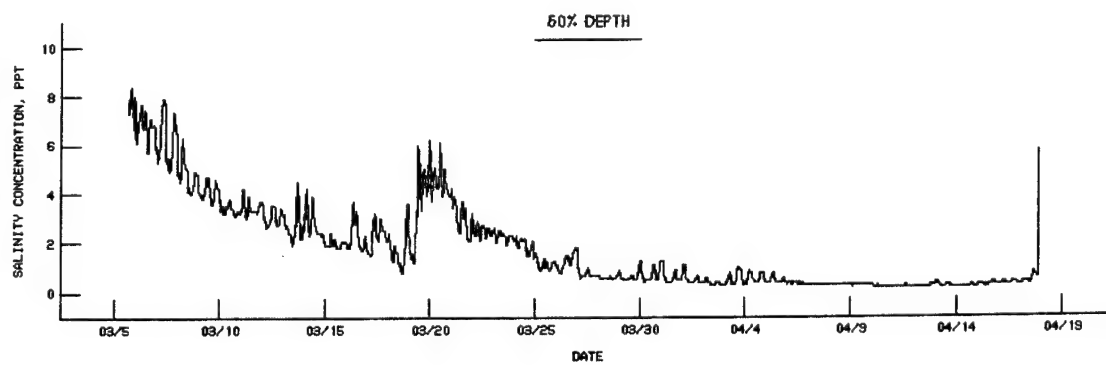
SALINITY CONCENTRATION
STATION S3.5
20% AND 80% DEPTHS
11/05/92 - 12/04/92



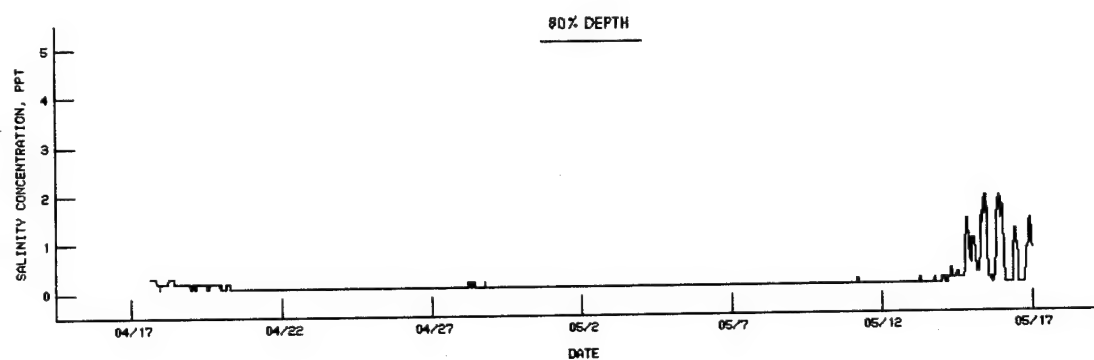
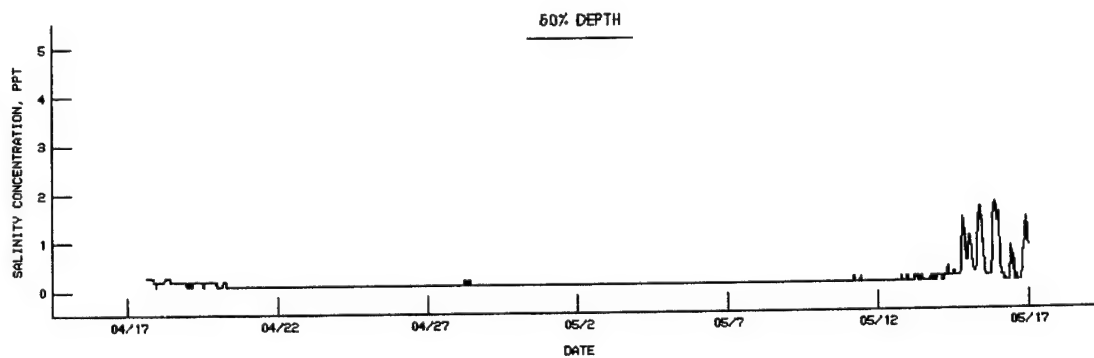
SALINITY CONCENTRATIONS
AT STATION S3.5
AT 20% AND 80% DEPTHS
12/04/92 - 01/07/93



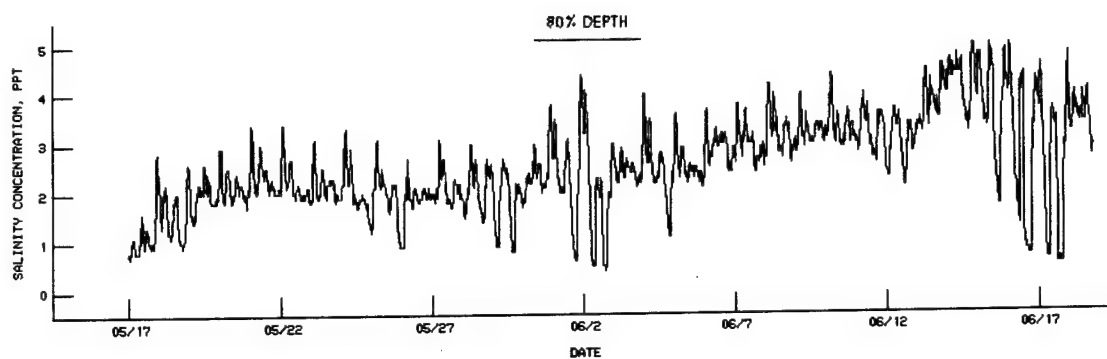
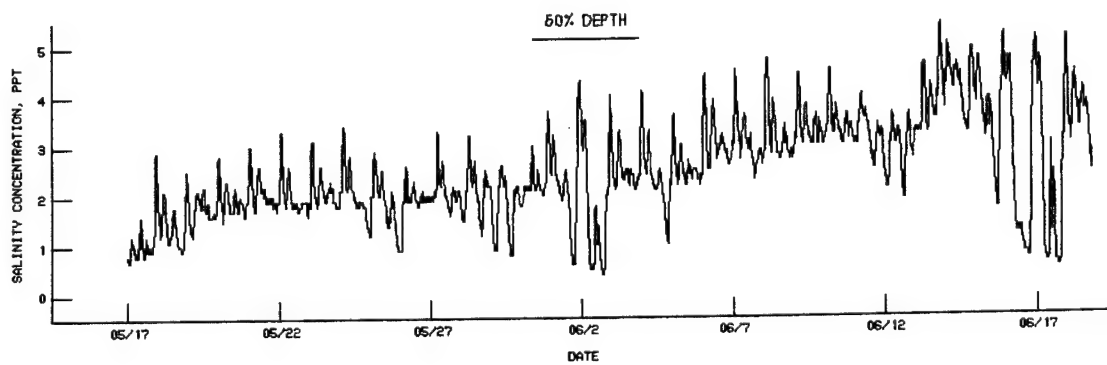
SALINITY CONCENTRATION
STATION S3.5
50% AND 80% DEPTHS
02/07/93 - 03/05/93



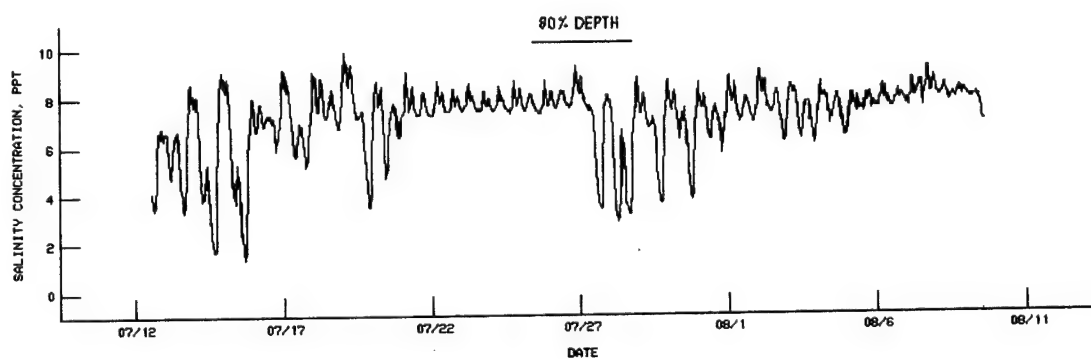
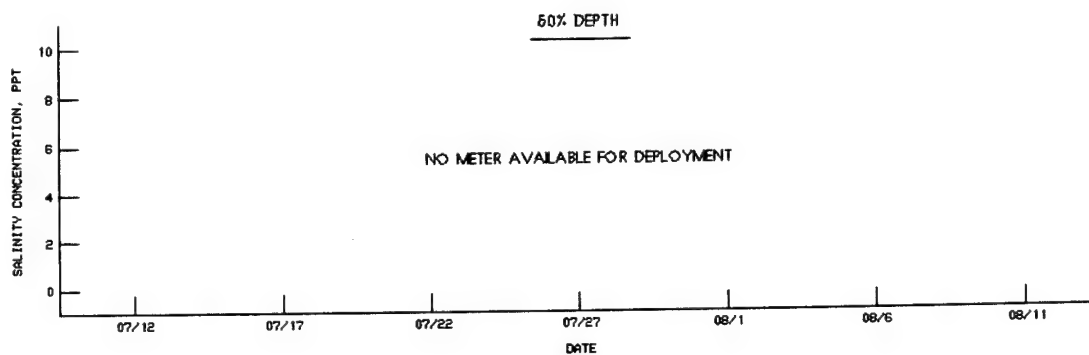
SALINITY CONCENTRATION
STATION S3.5
50% AND 80% DEPTHS
03/05/93 - 04/17/93



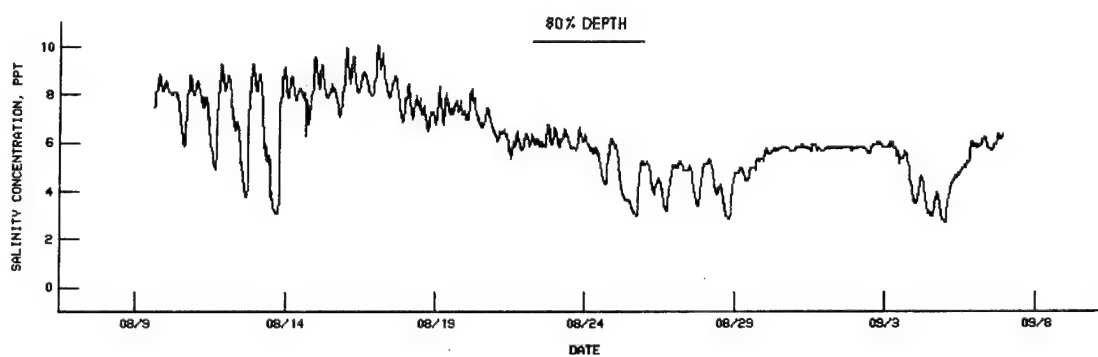
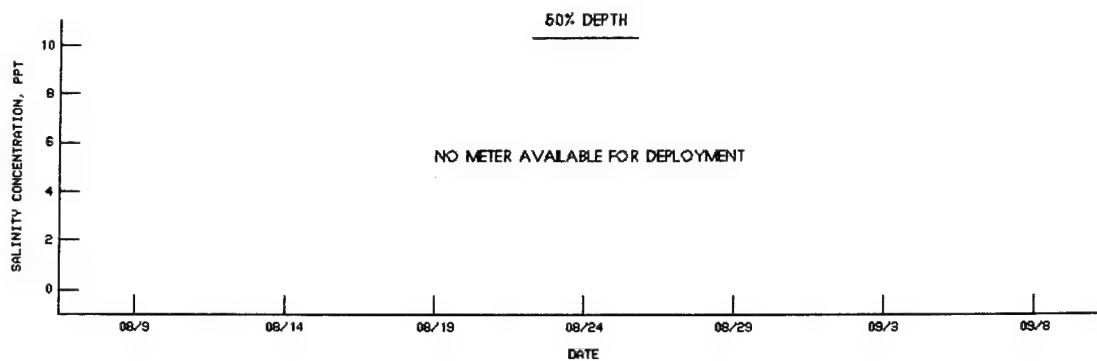
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STATION S3.5
50% AND 80% DEPTHS
04/17/93 - 05/17/93



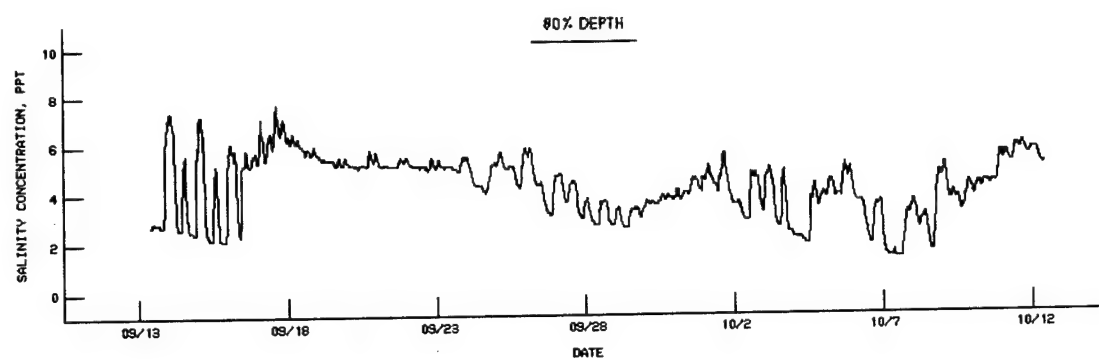
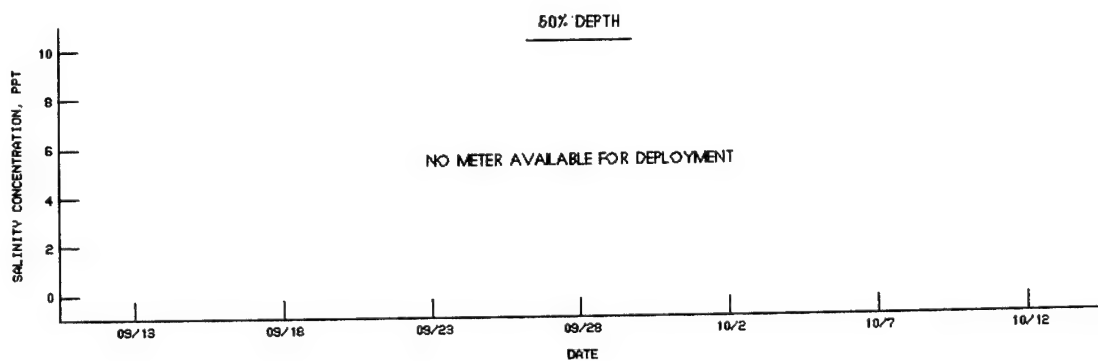
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STATION S3.5
50% AND 80% DEPTHS
05/17/93 - 06/17/93



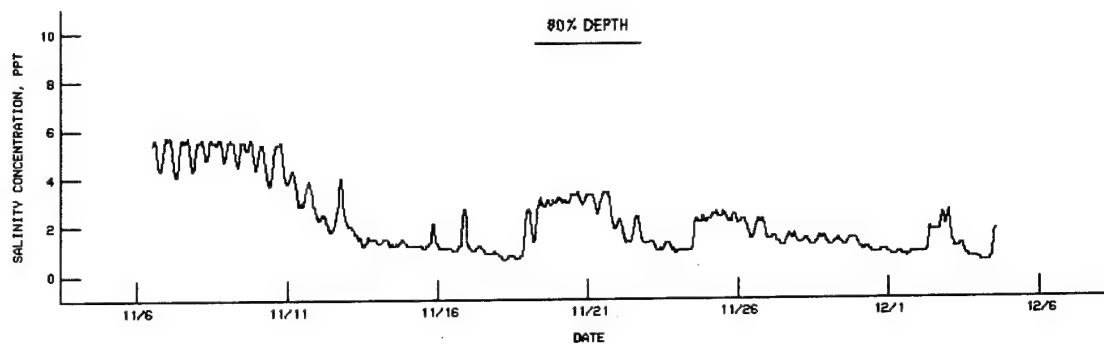
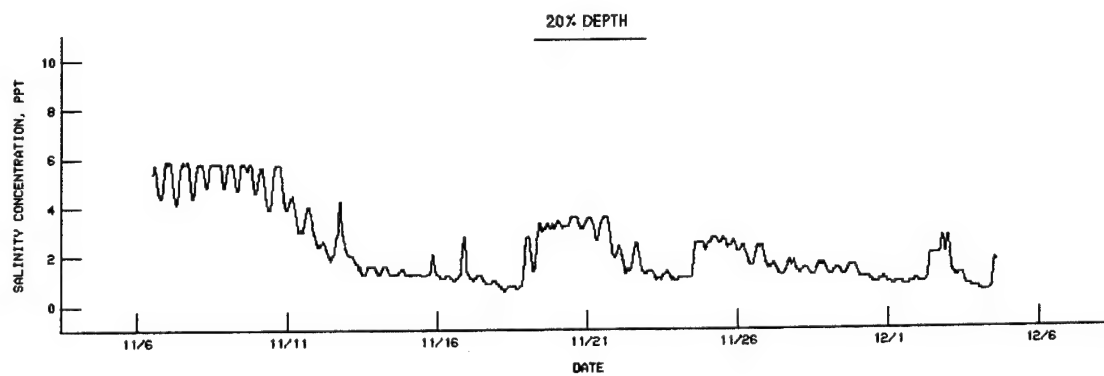
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STATION S3.5
50% AND 80% DEPTHS
07/12/93 - 08/09/93



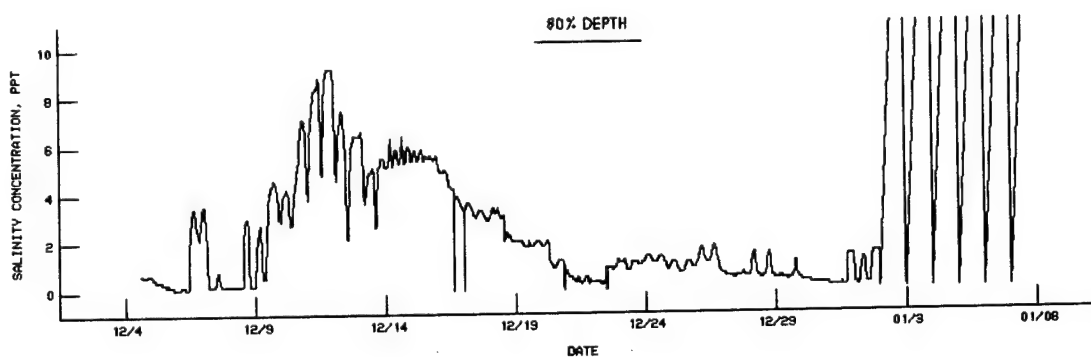
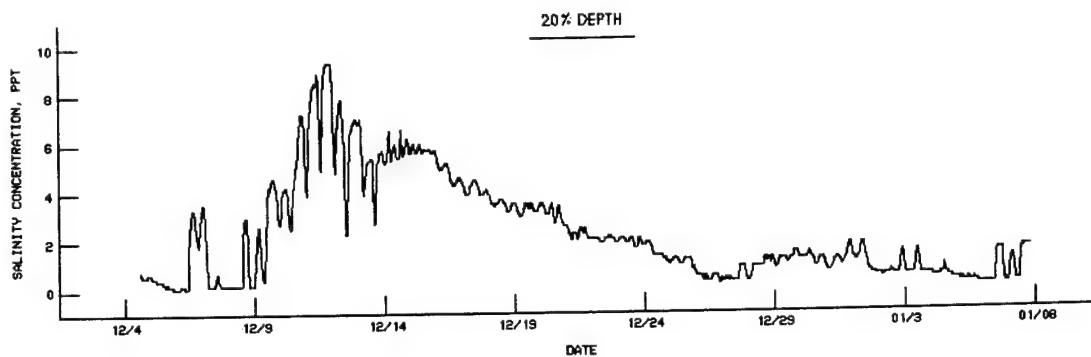
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STATION S3.5
50% AND 80% DEPTHS
08/09/93 - 09/06/93



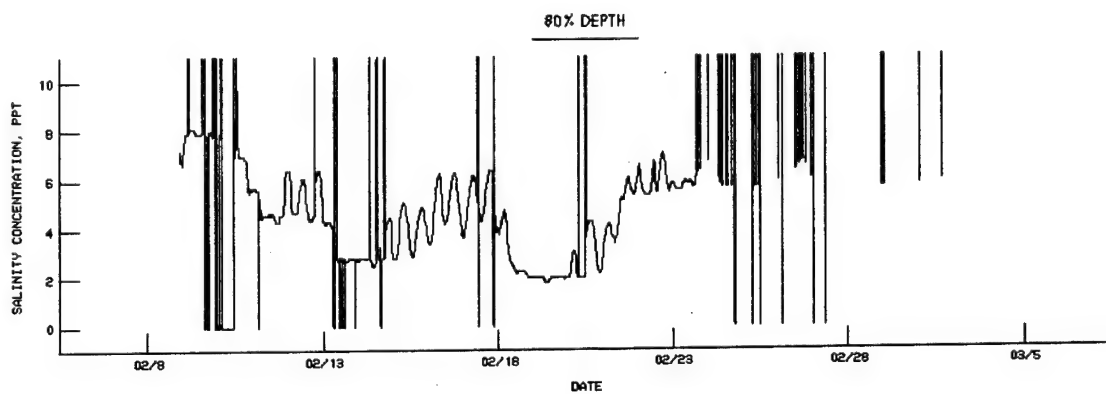
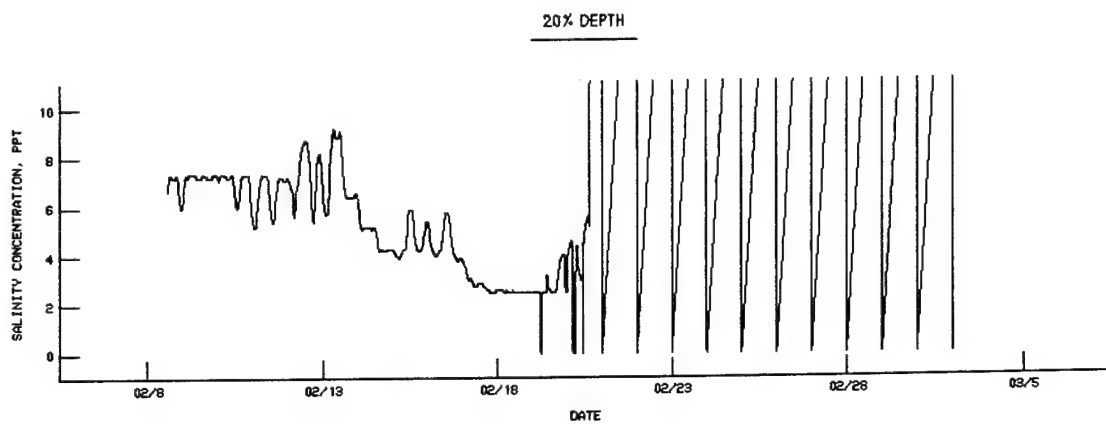
SALINITY CONCENTRATION
STATION S3.5
50% AND 80% DEPTHS
09/13/93 - 10/13/93



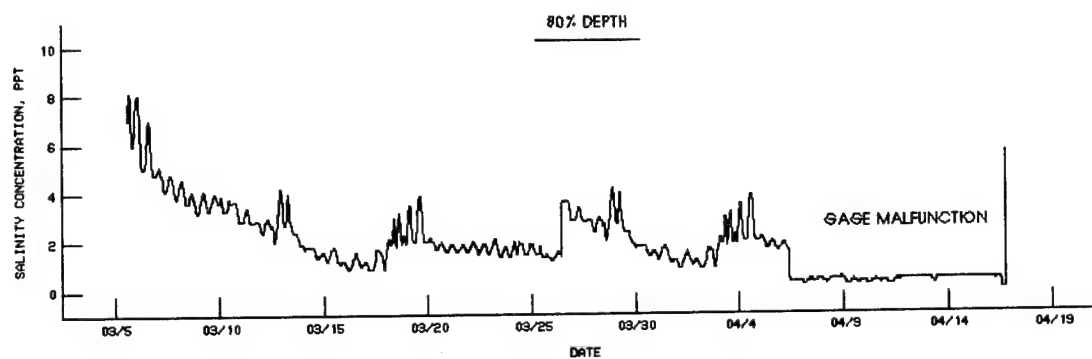
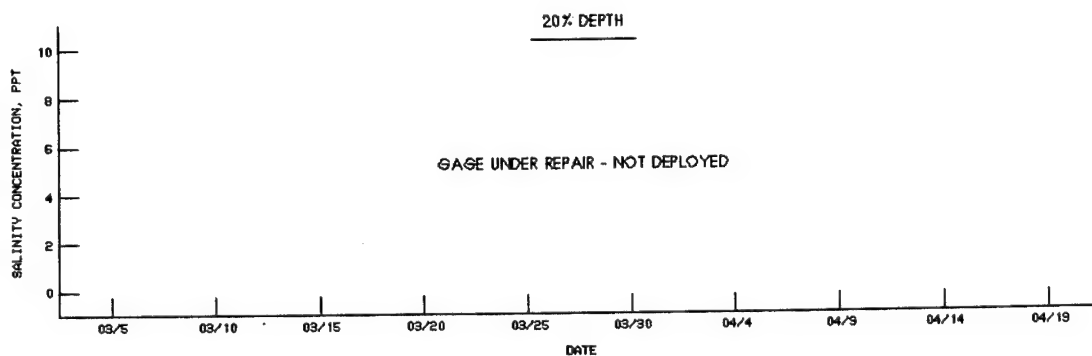
**SALINITY CONCENTRATION
STATION S3.9
20% AND 80% DEPTHS
11/06/92 - 12/04/92**



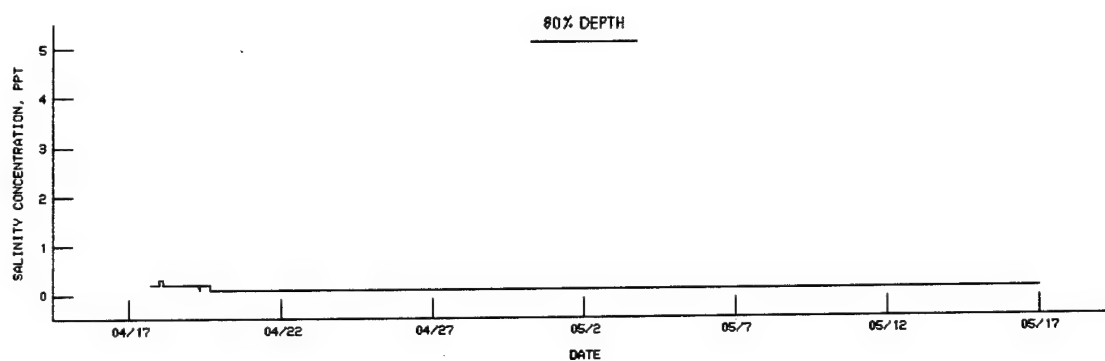
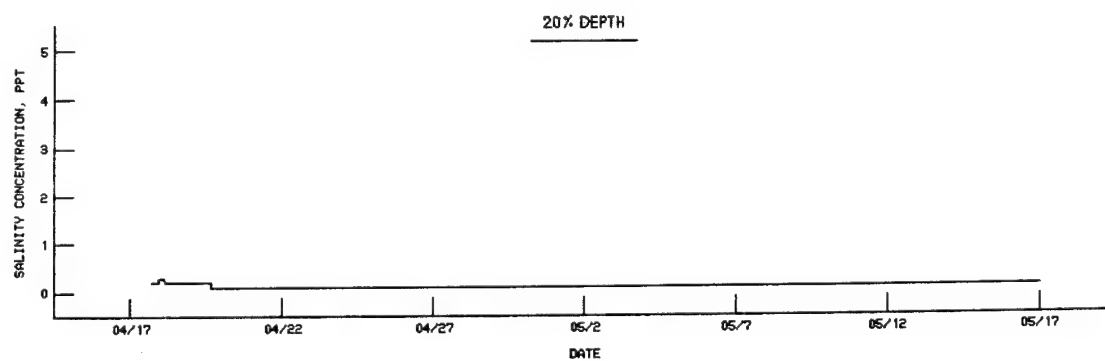
SALINITY CONCENTRATION
STATION S3.9
20% AND 80% DEPTHS
12/04/92 - 01/07/93



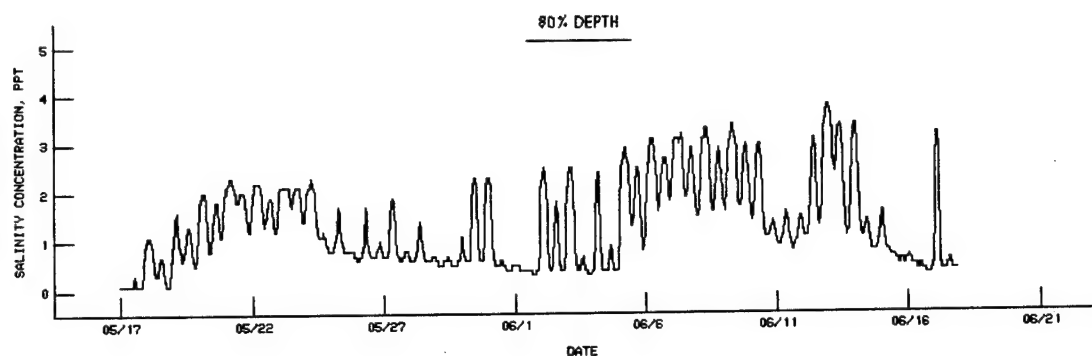
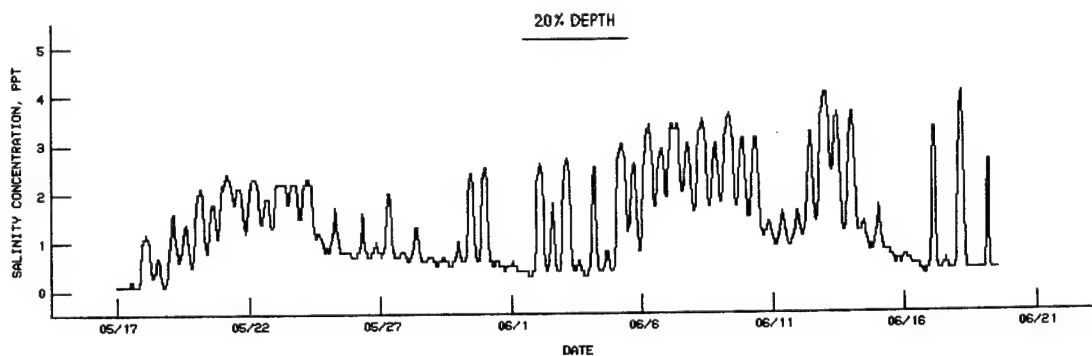
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STATION S3.9
20% AND 80% DEPTHS
02/08/93 - 03/03/93



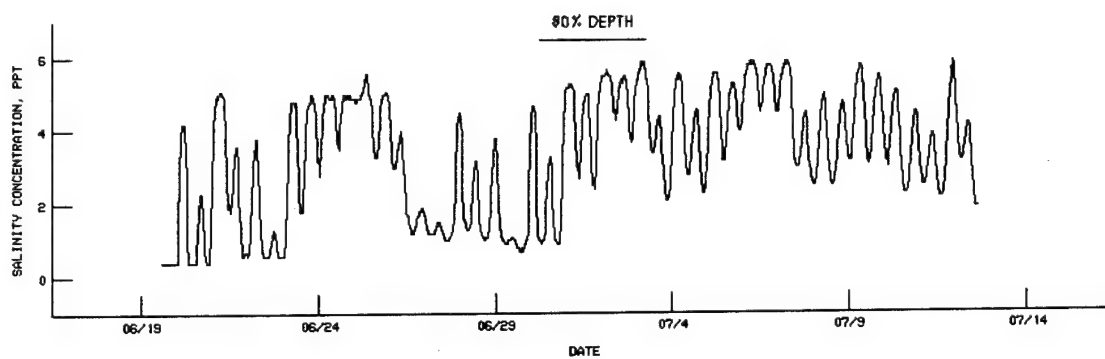
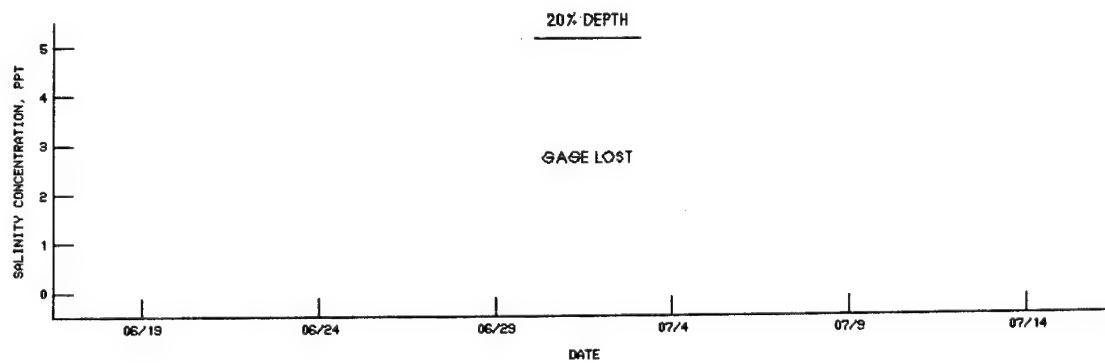
**SALINITY CONCENTRATION
STATION S3.9
20% AND 80% DEPTHS
03/05/93 - 04/17/93**



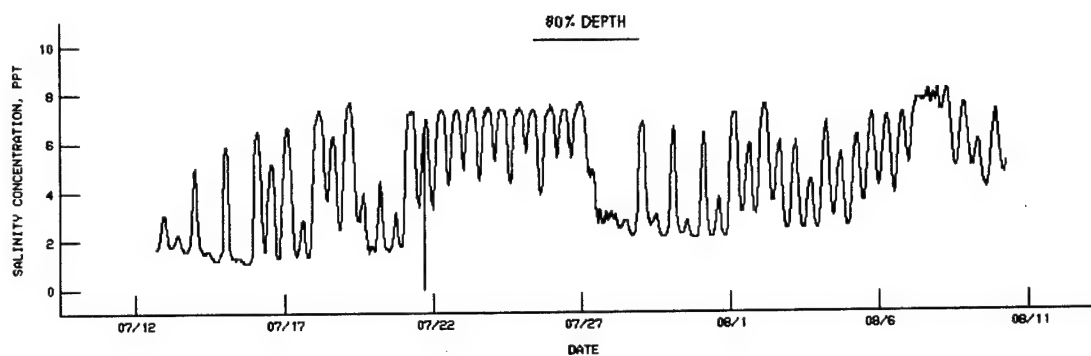
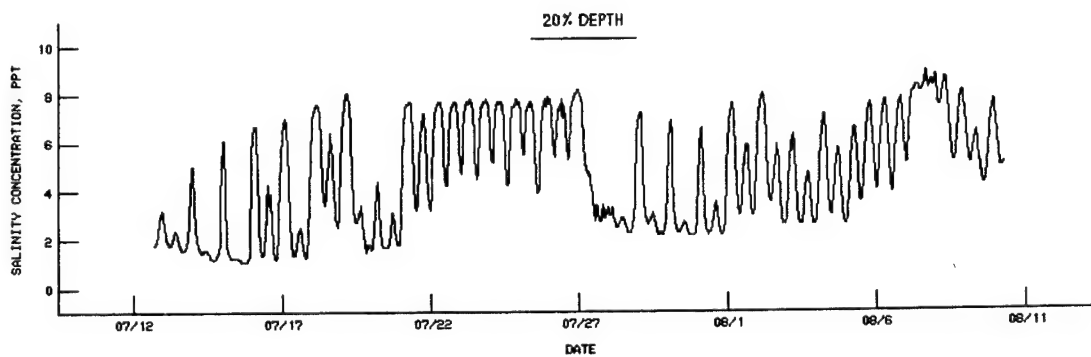
SALINITY CONCENTRATION
STATION S3.9
20% AND 80% DEPTHS
04/17/93 - 05/17/93



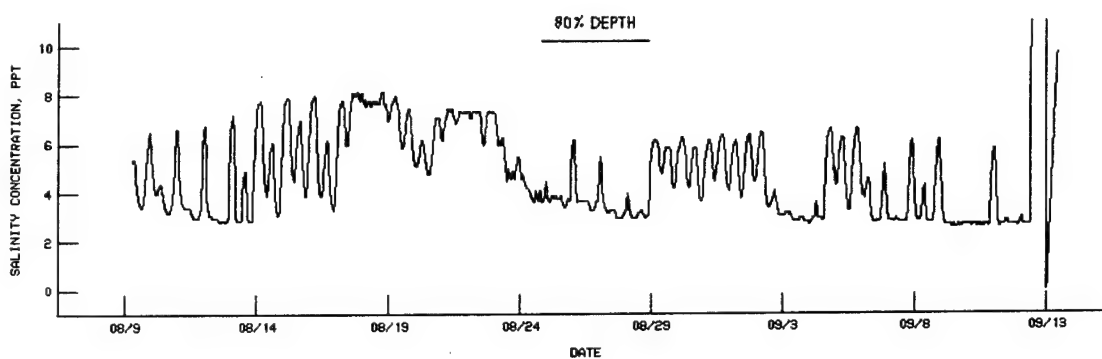
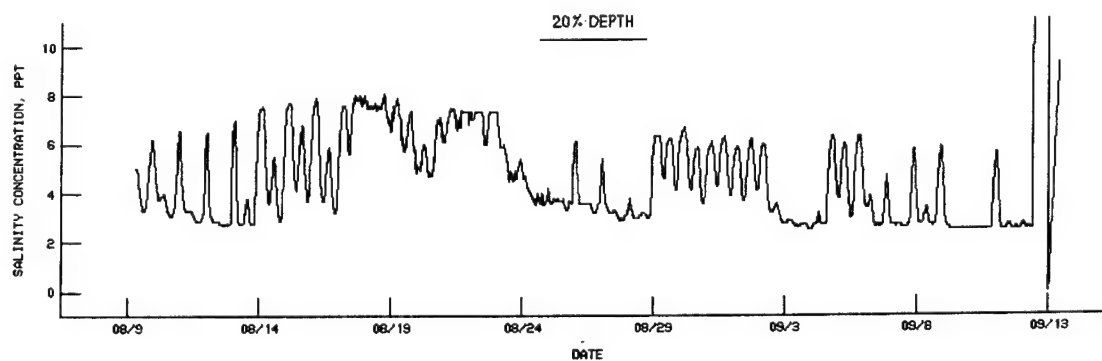
SALINITY CONCENTRATION
STATION S3.9
20% AND 80% DEPTHS
05/17/93 - 06/19/93



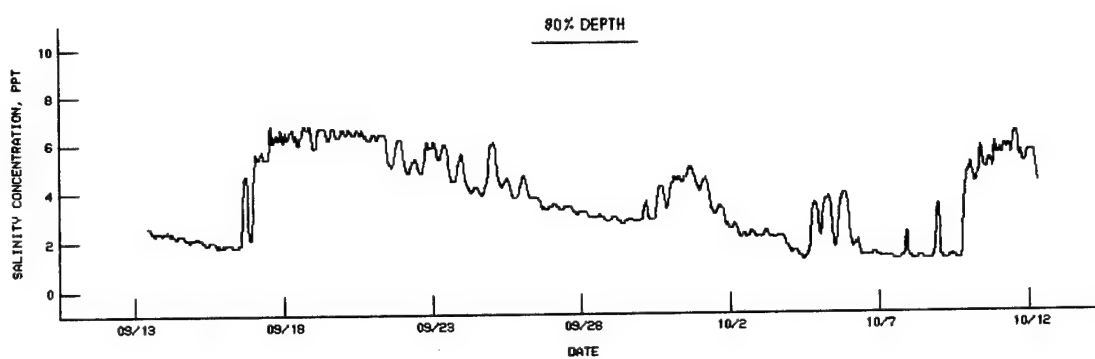
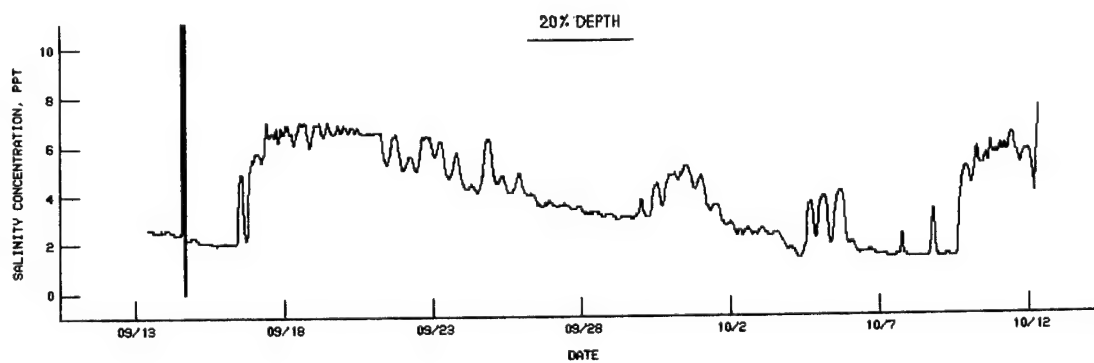
SALINITY CONCENTRATION
STATION S3.9
20% AND 80% DEPTHS
06/19/93 - 07/12/93



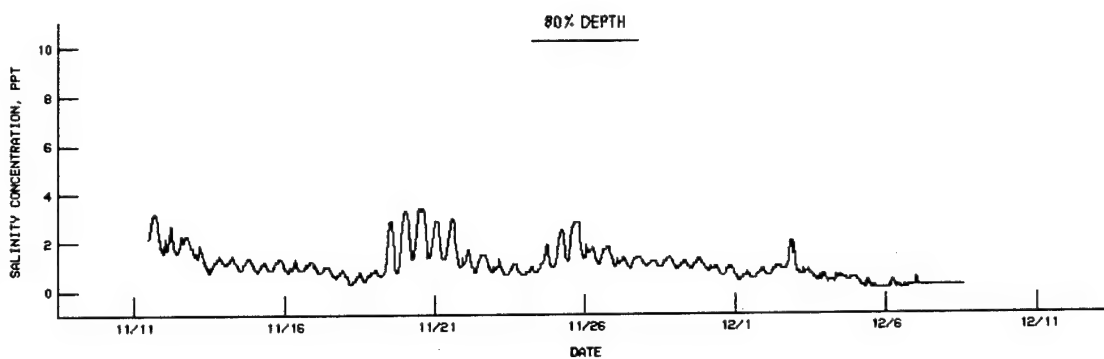
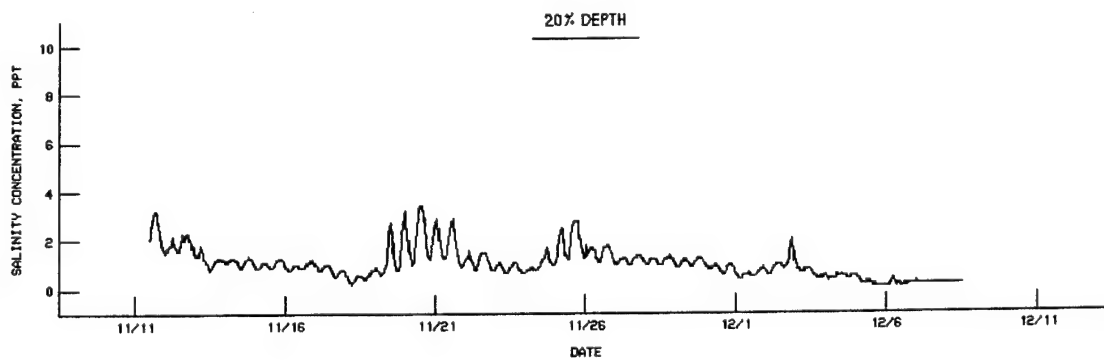
**SALINITY CONCENTRATION
STATION S3.9
20% AND 80% DEPTHS
07/12/93 - 08/10/93**



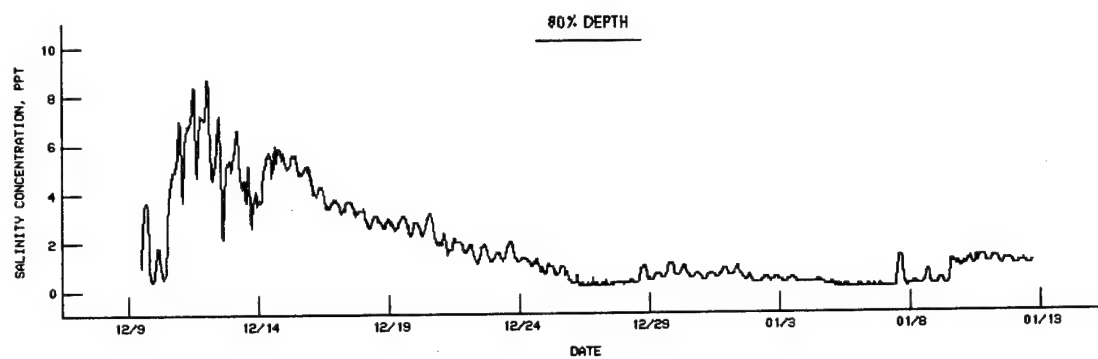
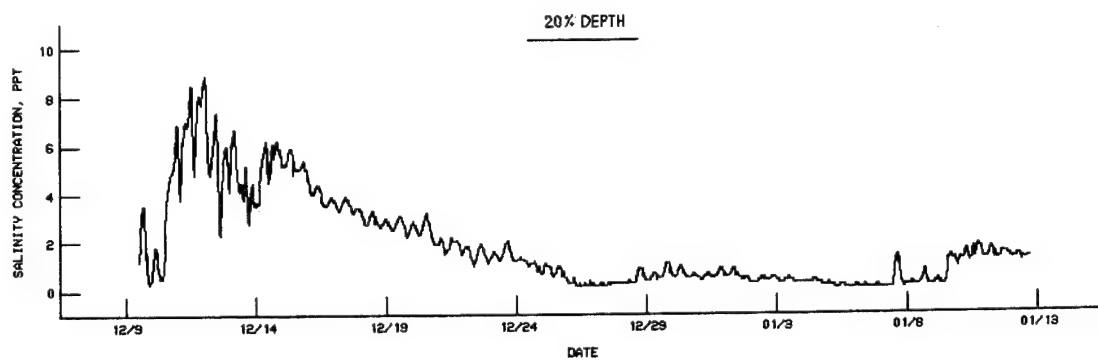
SALINITY CONCENTRATION
STATION S3.9
20% AND 80% DEPTHS
08/09/93 - 09/13/93



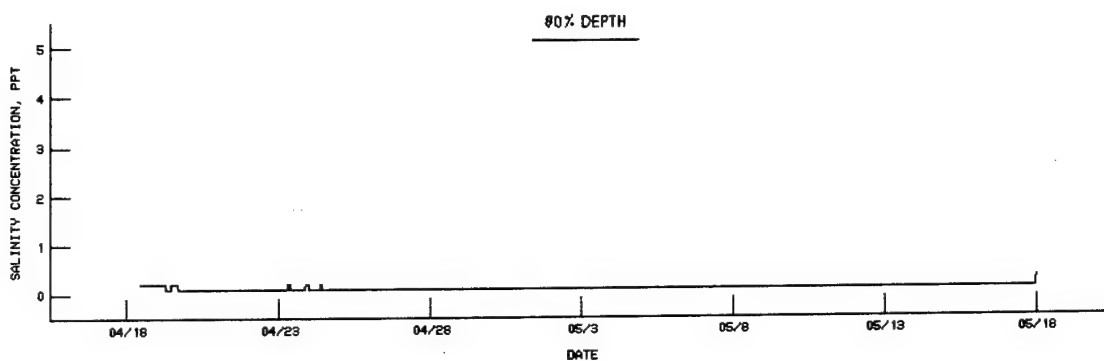
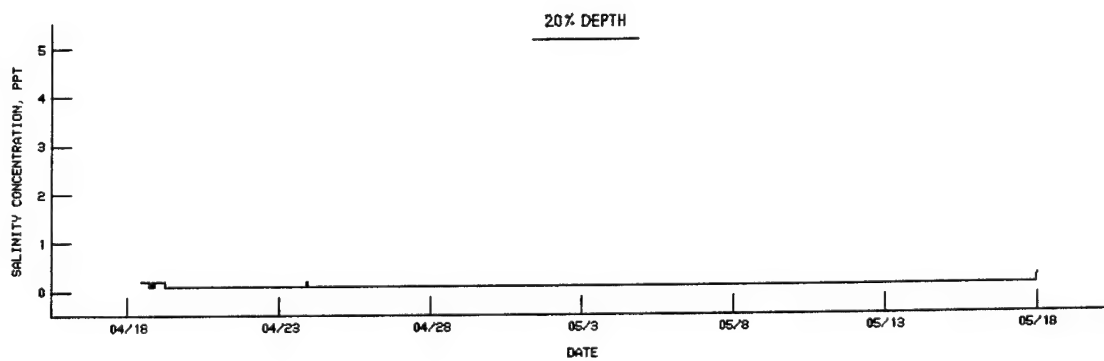
SALINITY CONCENTRATION
STATION S3.9
20% AND 80% DEPTHS
09/13/93 - 10/13/93



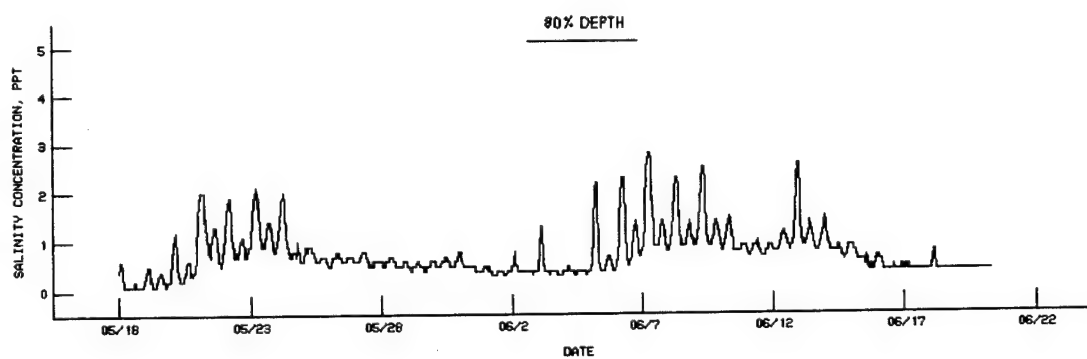
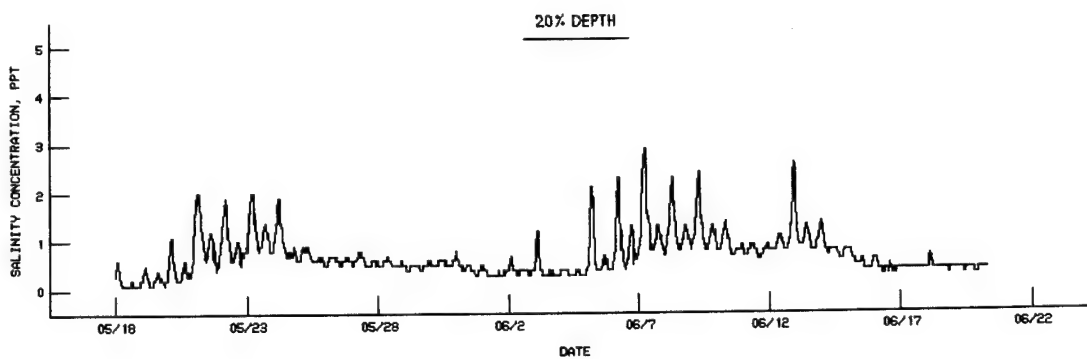
SALINITY CONCENTRATION
STATION S4.9
20% AND 80% DEPTHS
11/11/92 - 12/08/92



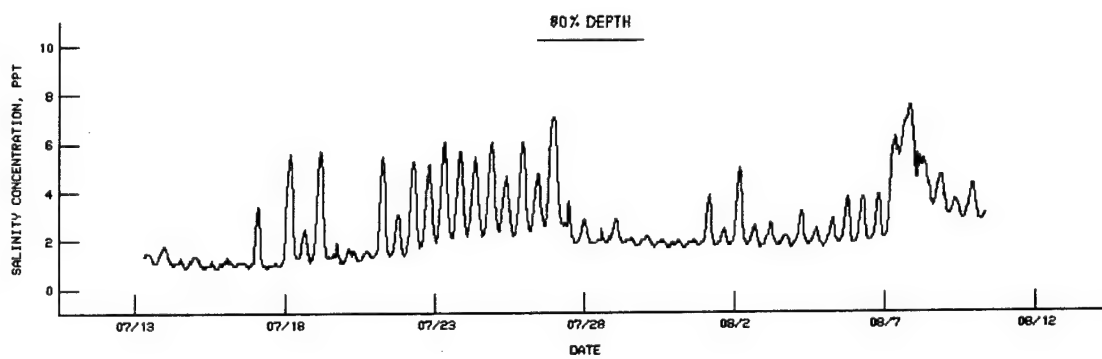
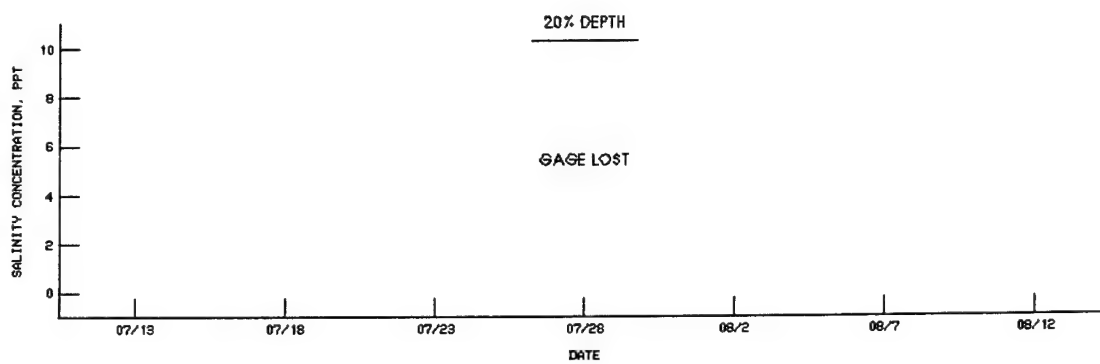
SALINITY CONCENTRATION
STATION S4.8
20% AND 80% DEPTHS
12/09/92 - 01/12/93



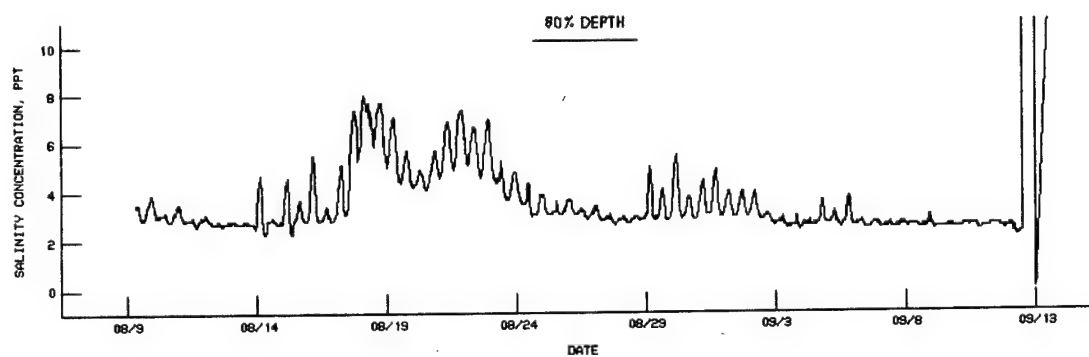
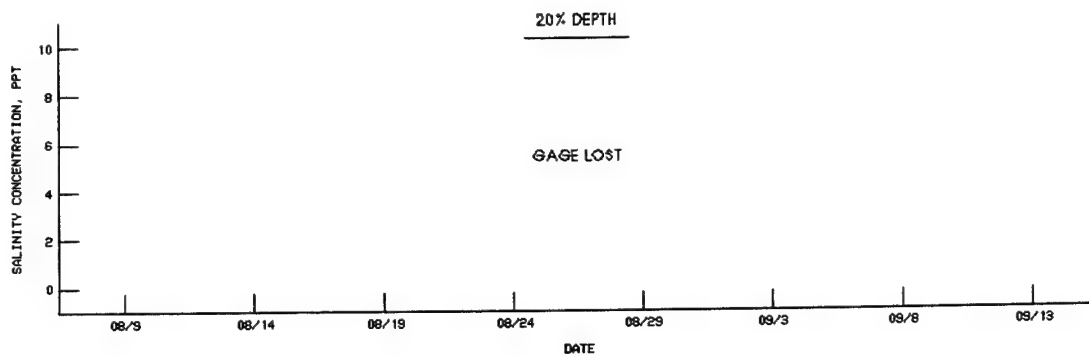
SALINITY CONCENTRATION
STATION S4.8
20% AND 80% DEPTHS
04/18/93 - 05/18/93



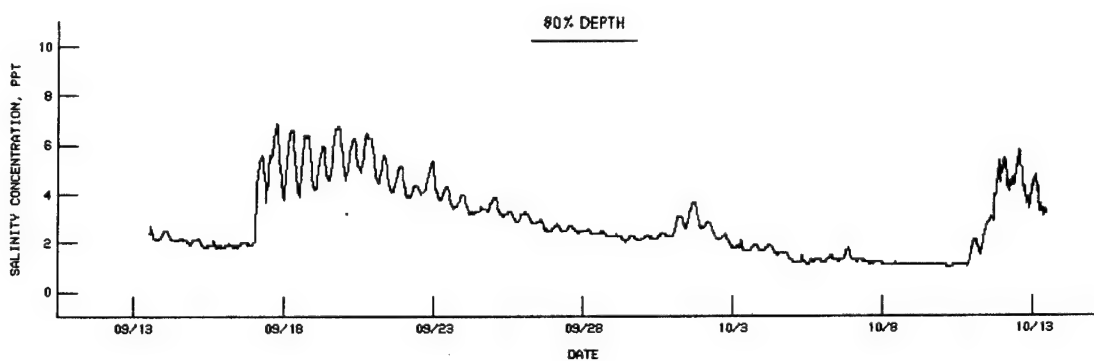
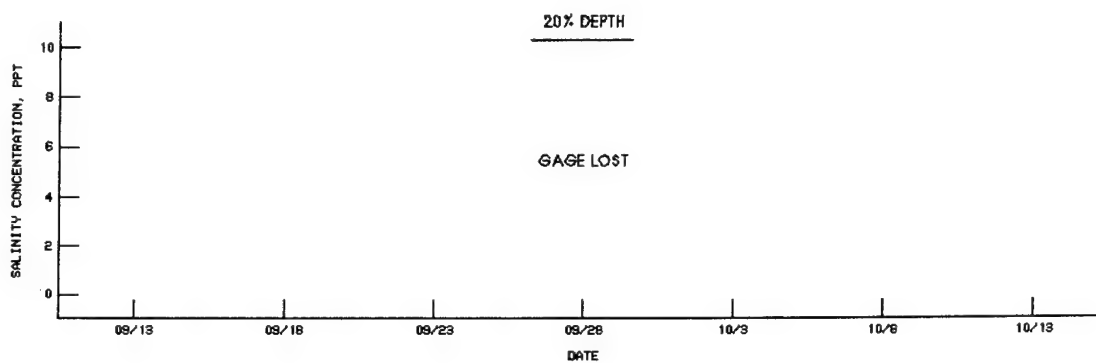
SALINITY CONCENTRATION
STATION S4.8
20% AND 80% DEPTHS
05/18/93 - 06/20/93



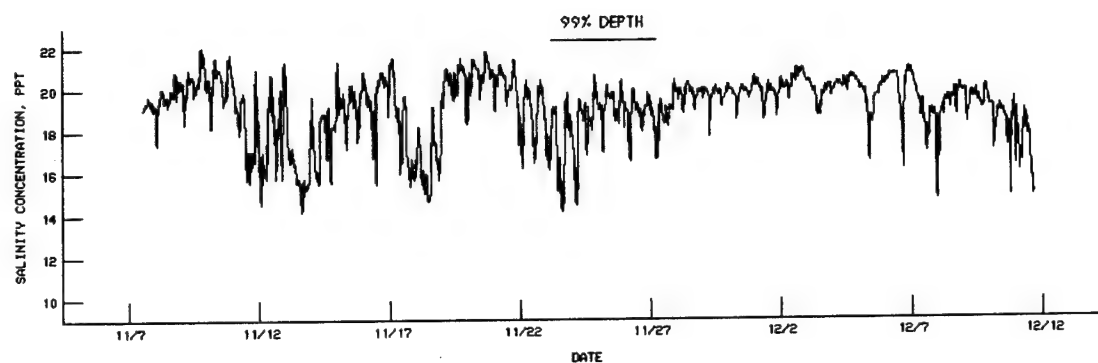
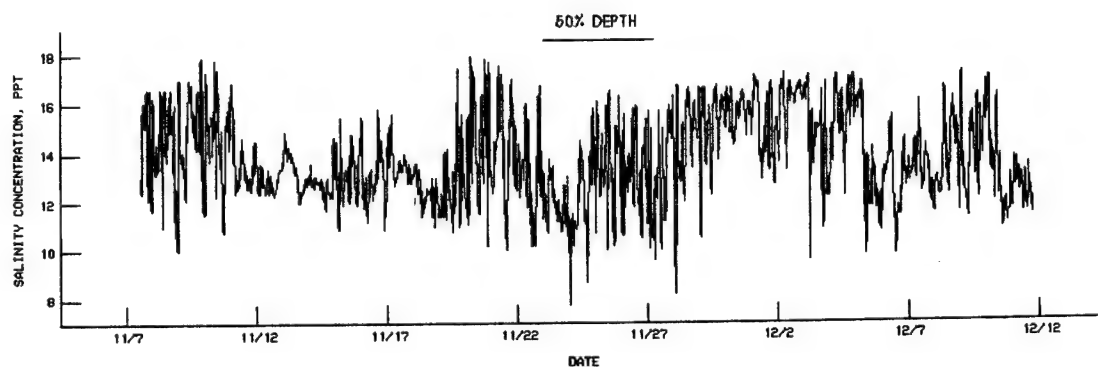
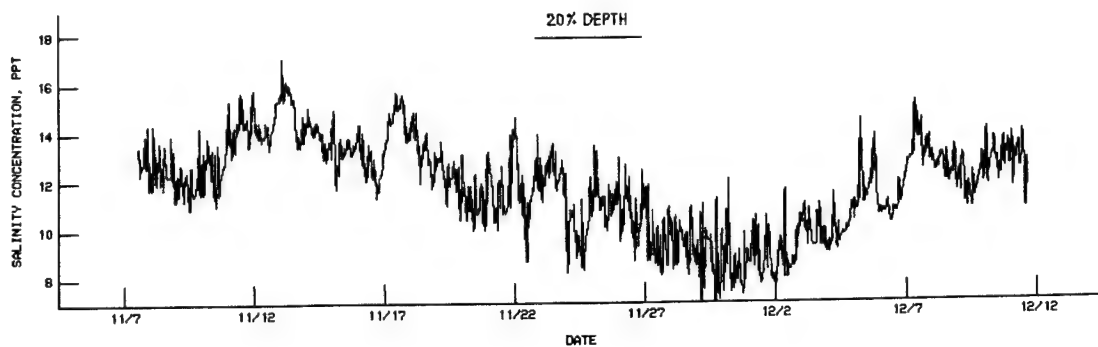
SALINITY CONCENTRATION
STATION S4.8
20% AND 80% DEPTHS
07/13/93 - 08/10/93



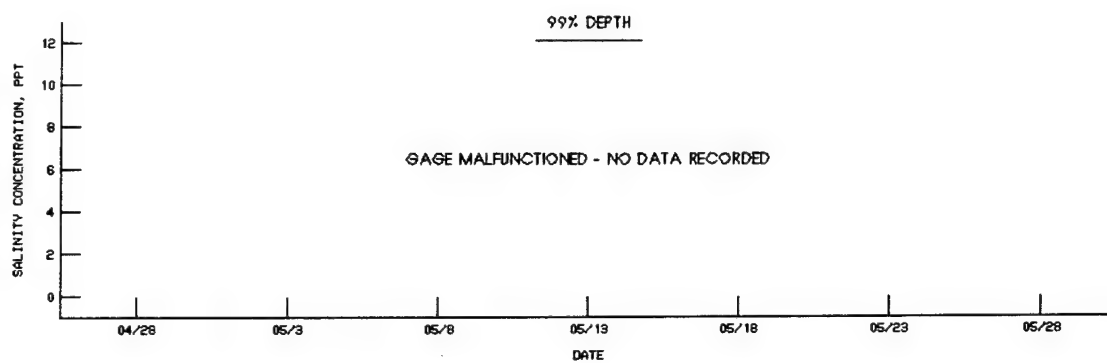
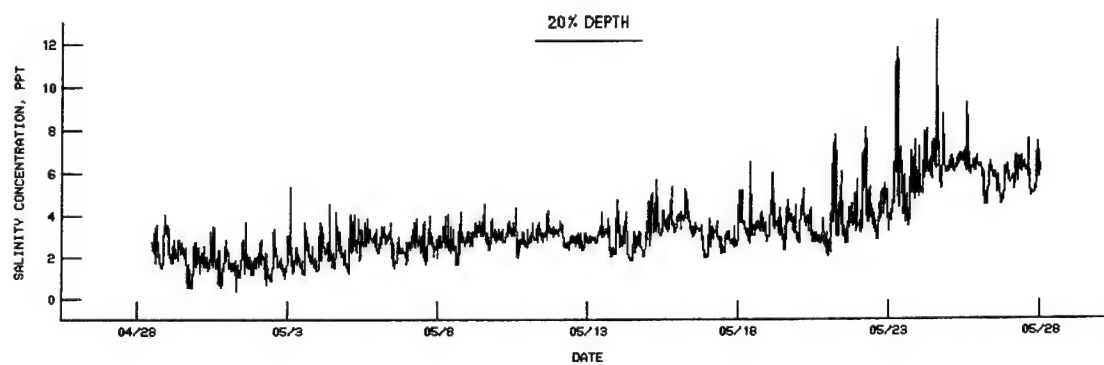
SALINITY CONCENTRATION
STATION S4.8
20% AND 80% DEPTHS
08/09/93 - 09/13/93



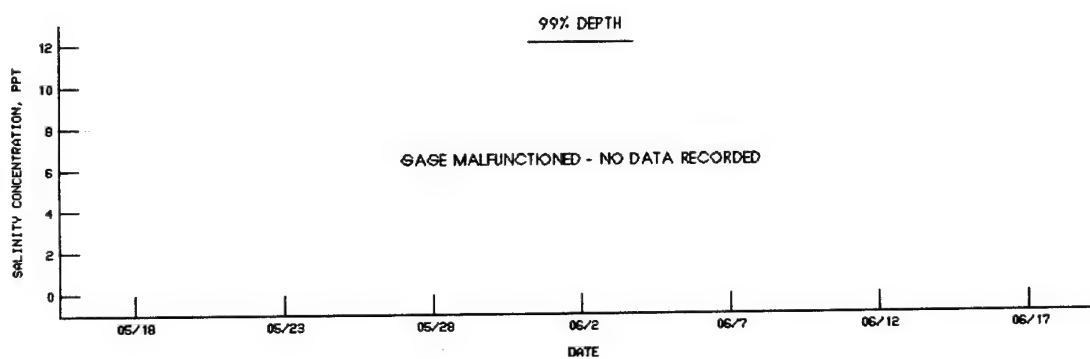
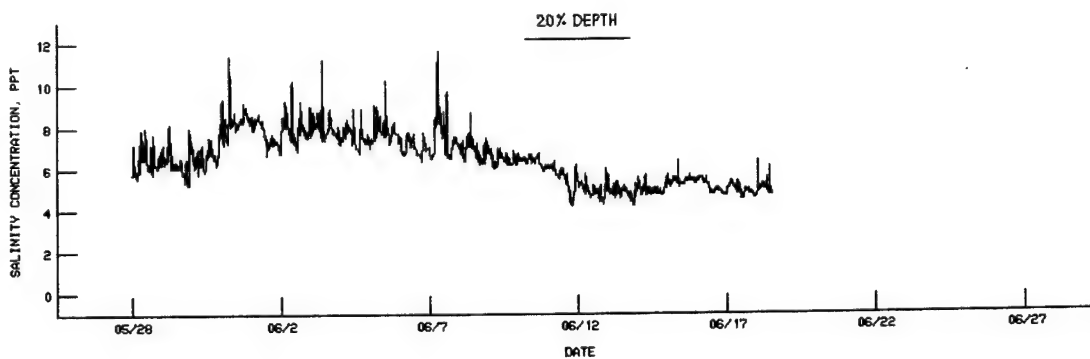
SALINITY CONCENTRATION
STATION S4.8
20% AND 80% DEPTHS
09/13/93 - 10/13/93



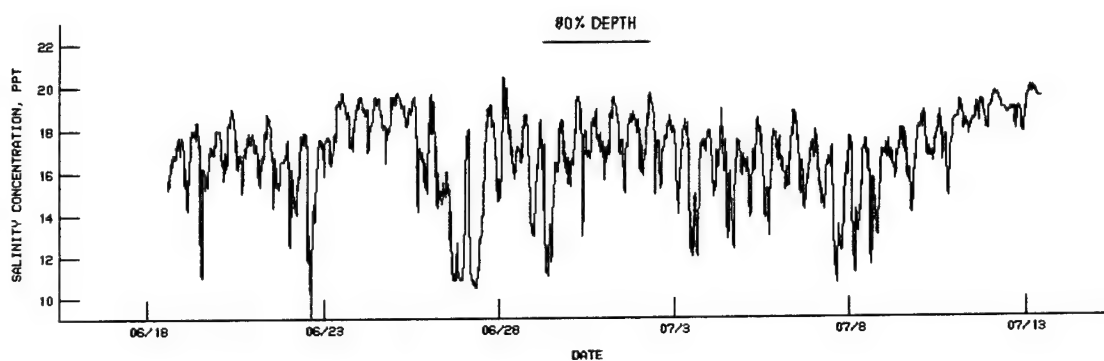
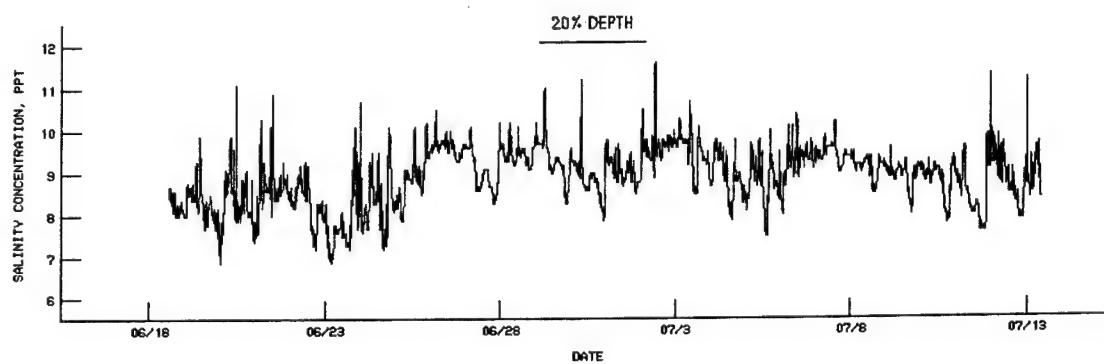
SALINITY CONCENTRATION
STATION S6.2
20%, 50%, AND 99% DEPTHS
11/07/92 - 12/11/92



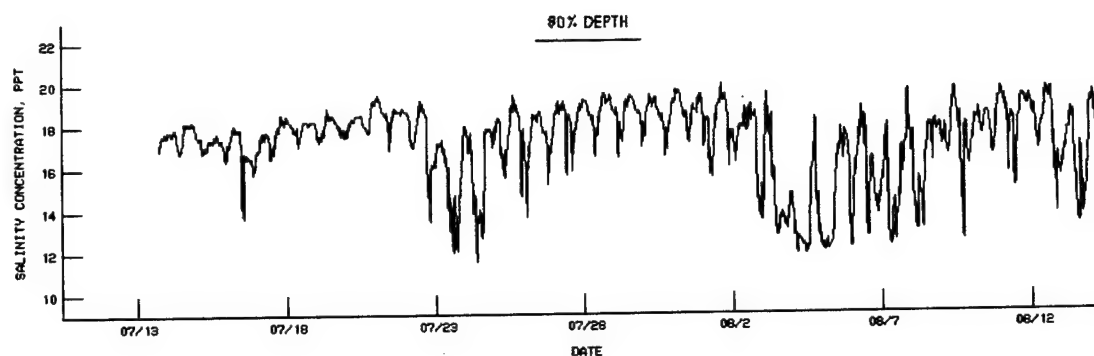
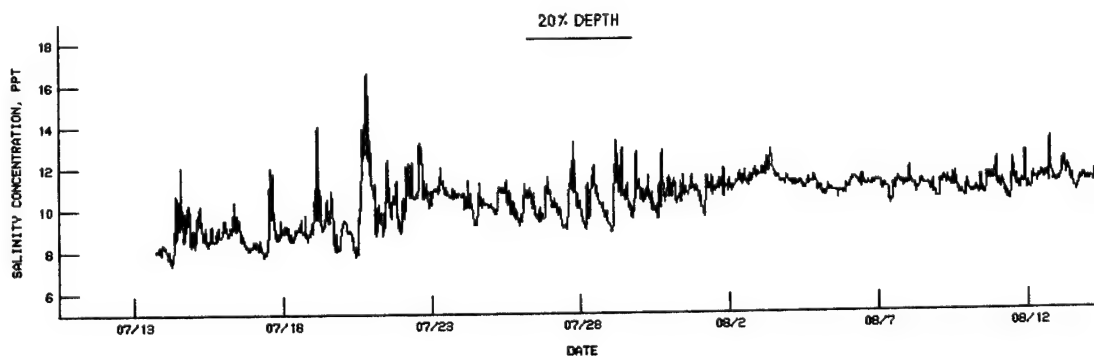
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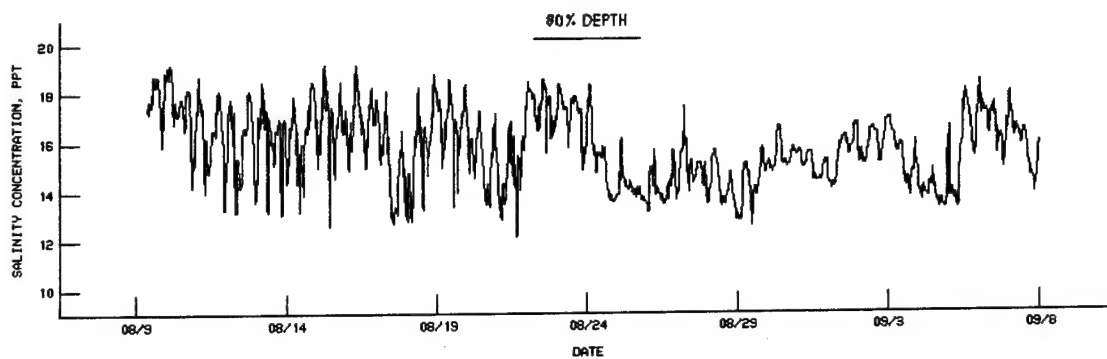
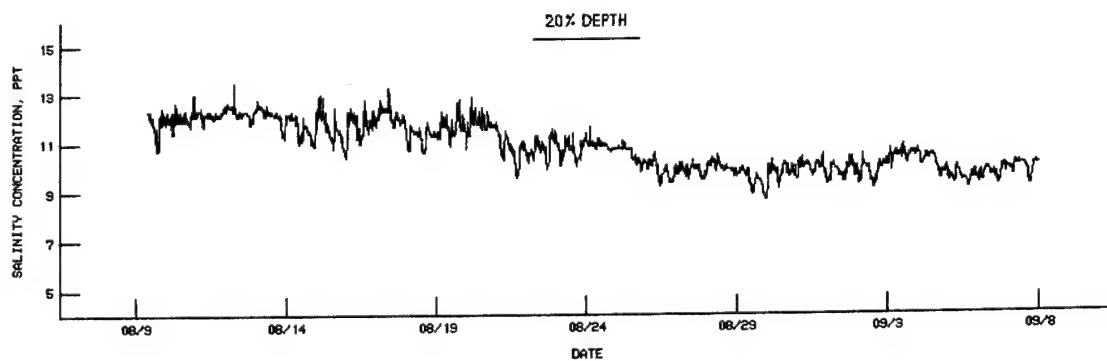
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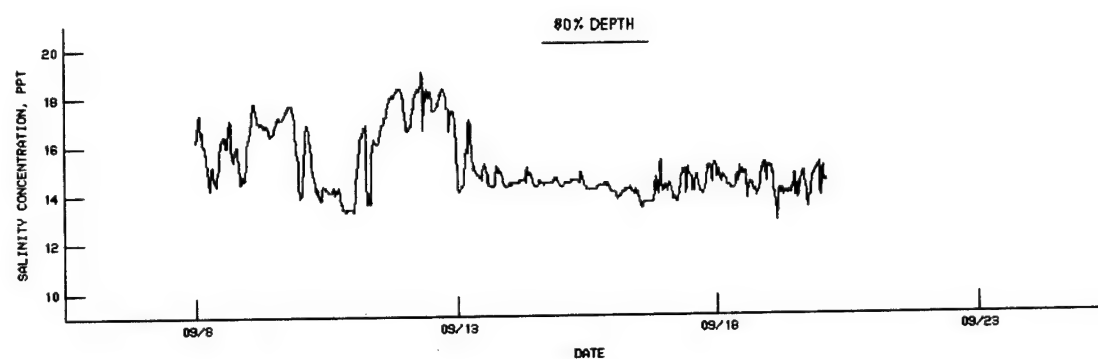
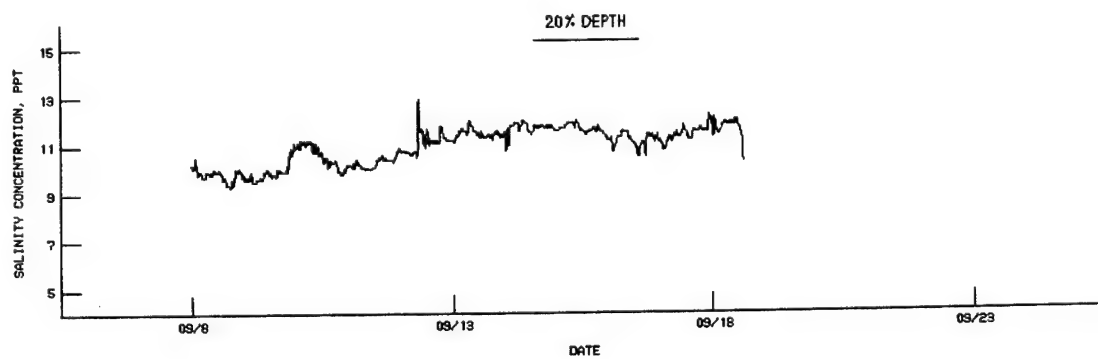
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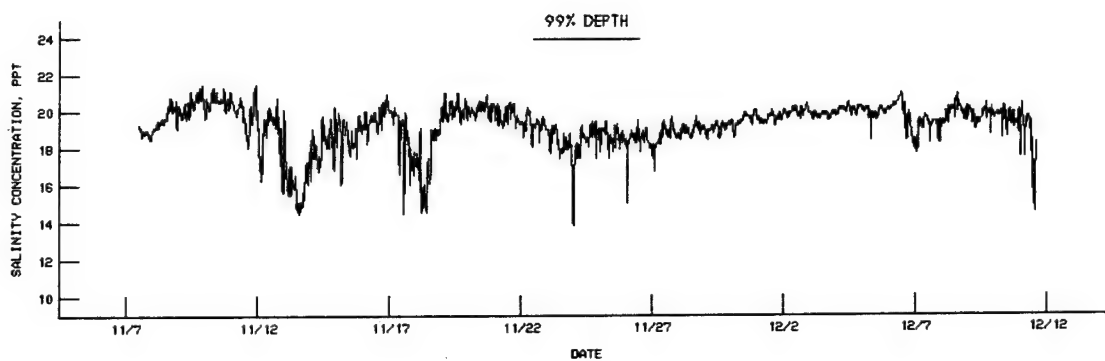
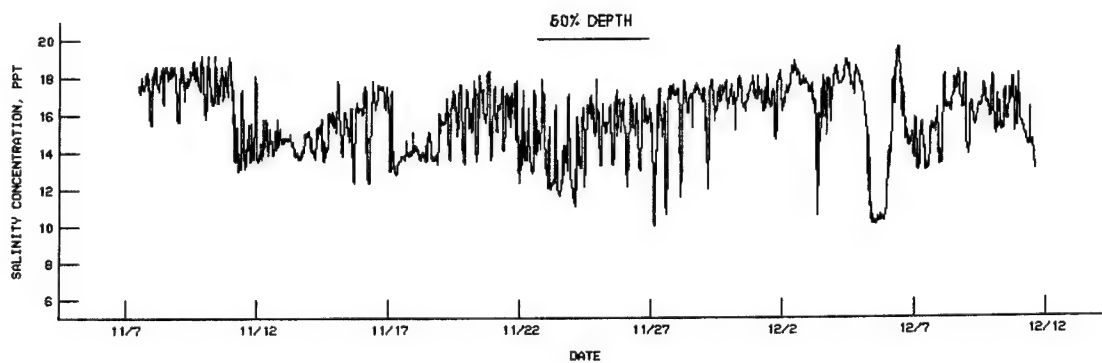
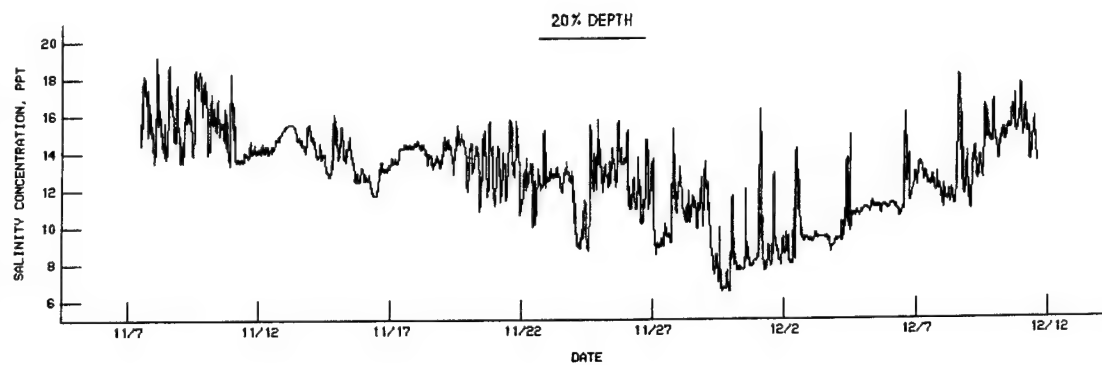
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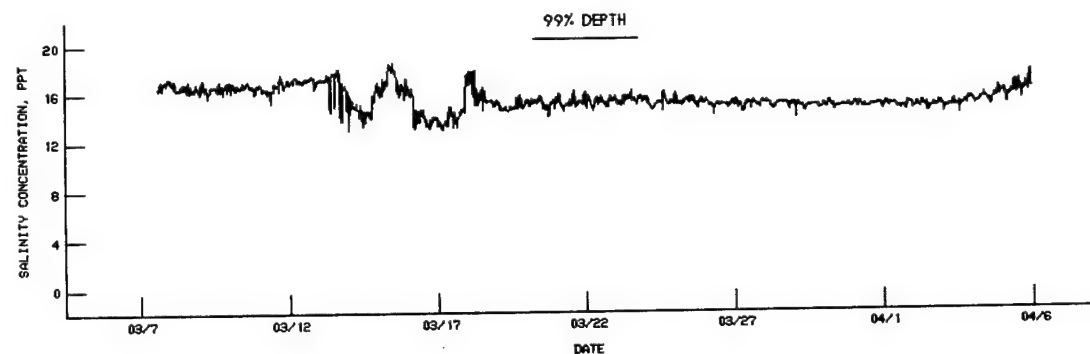
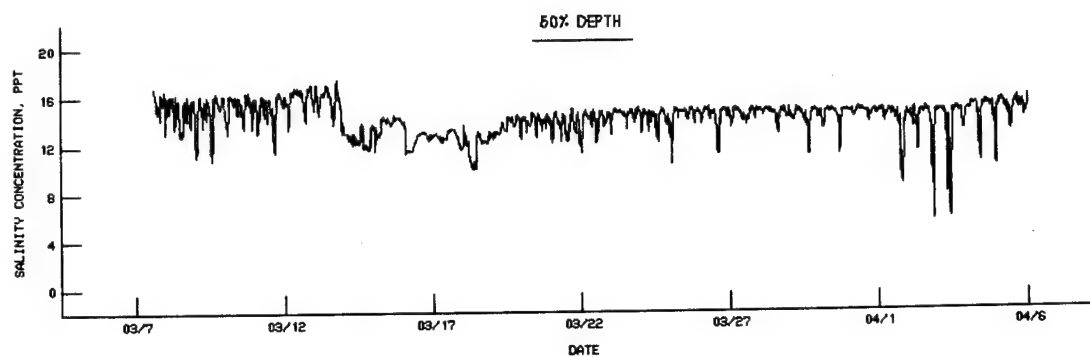
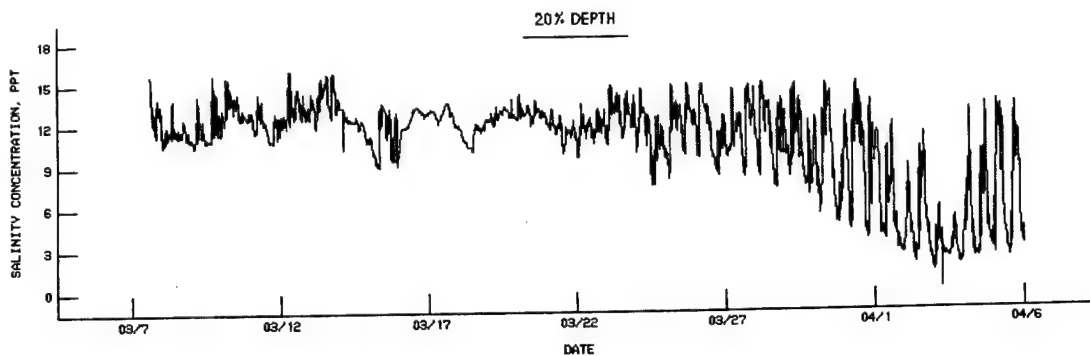
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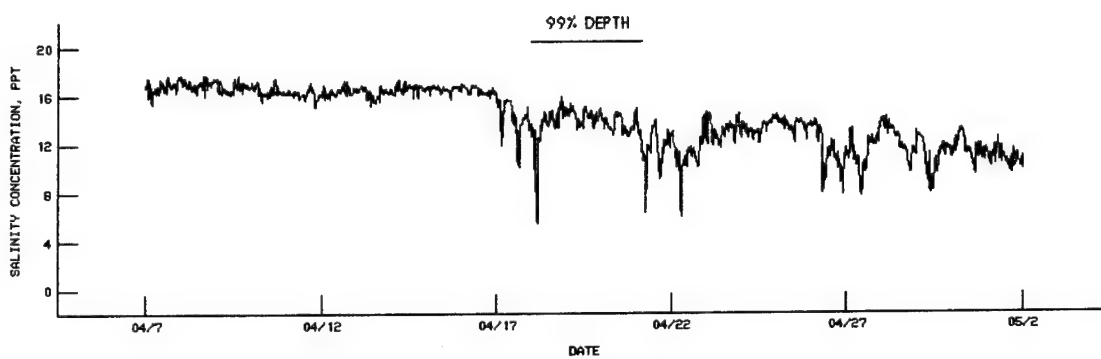
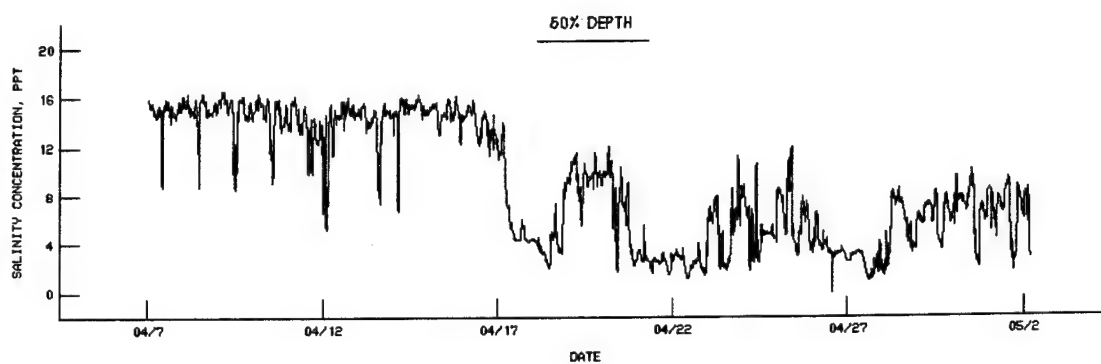
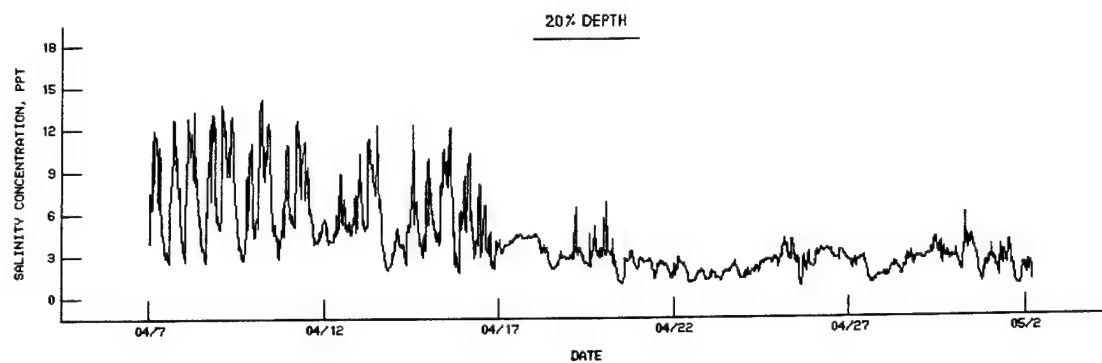
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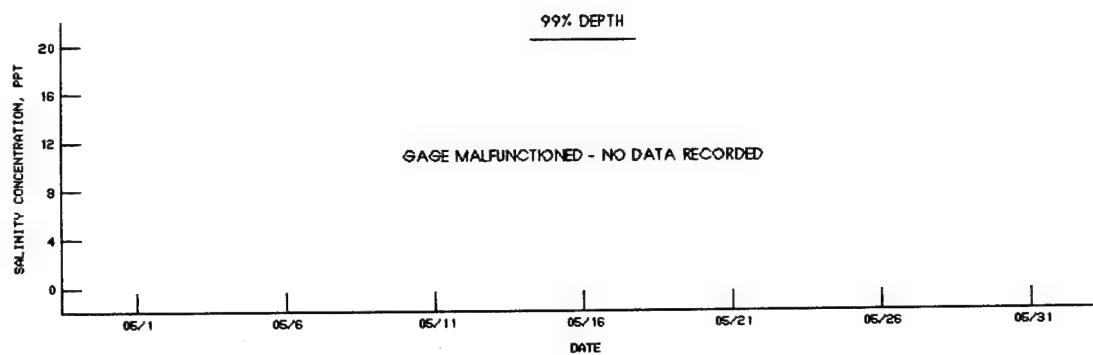
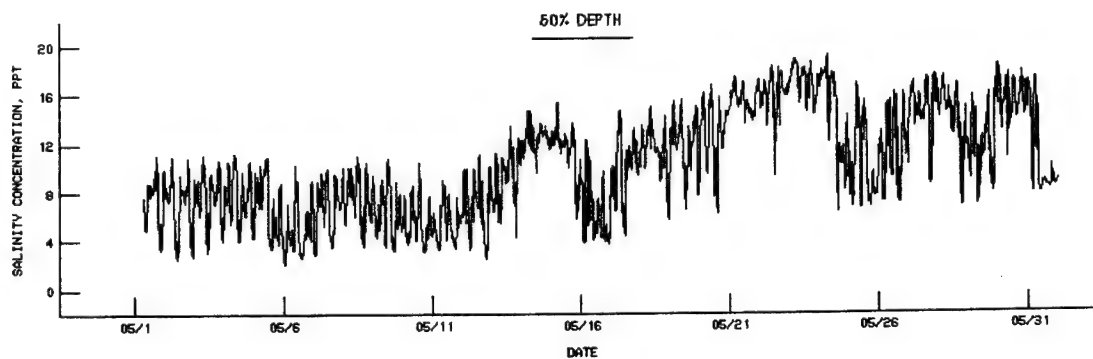
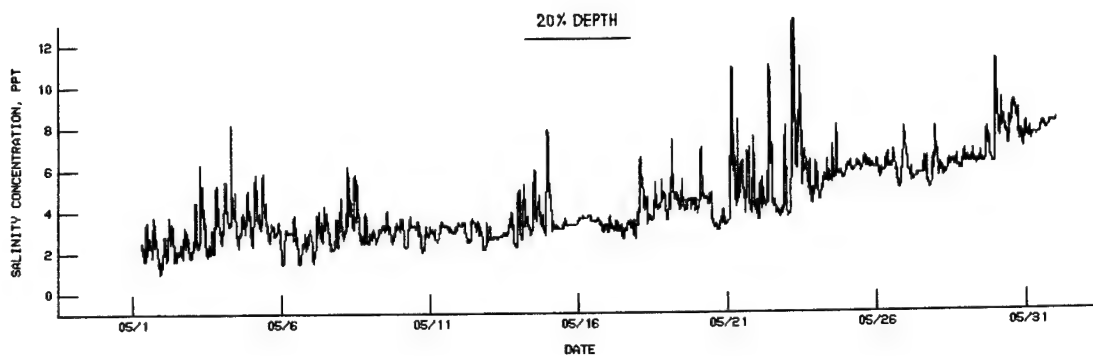
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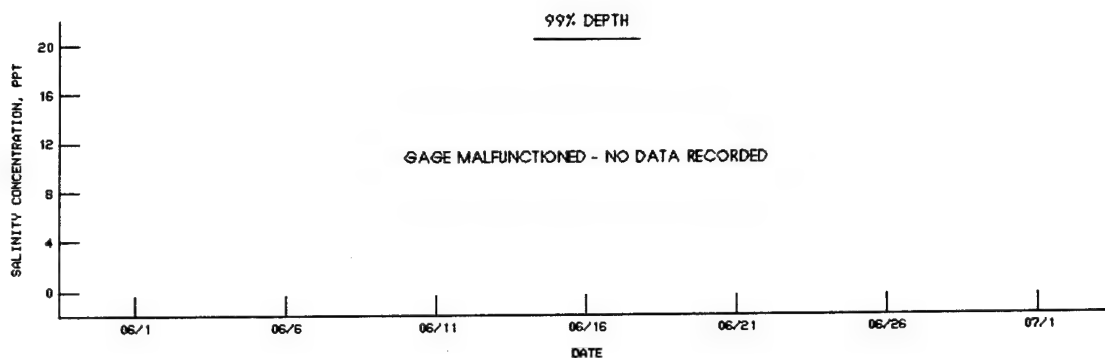
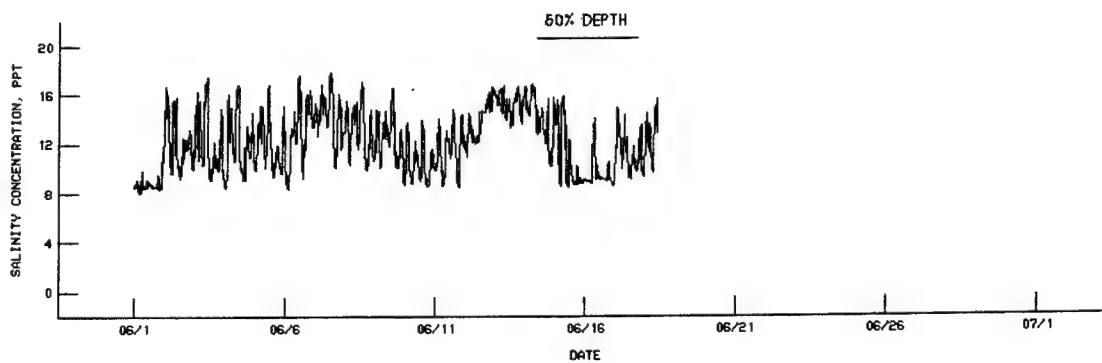
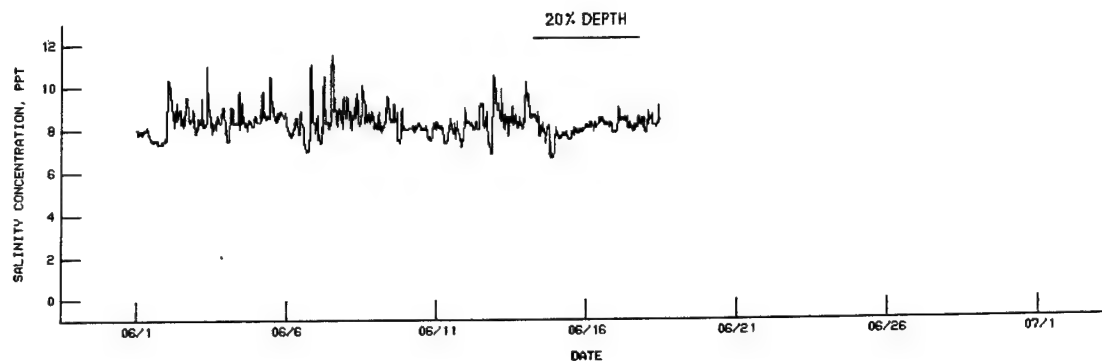
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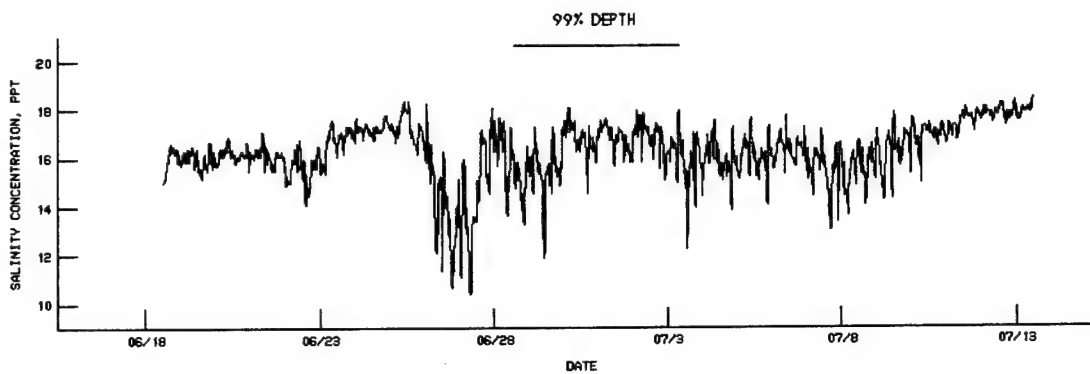
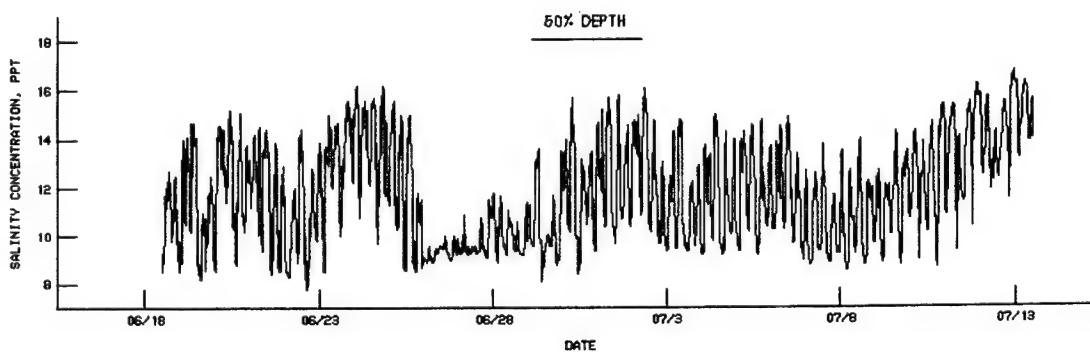
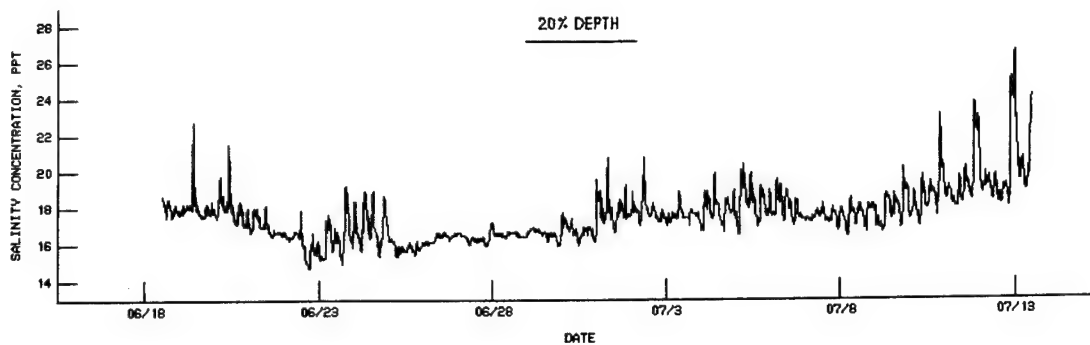
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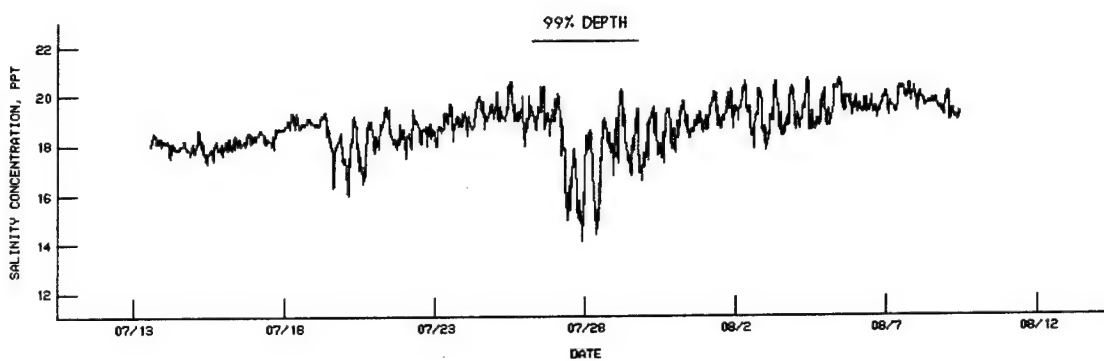
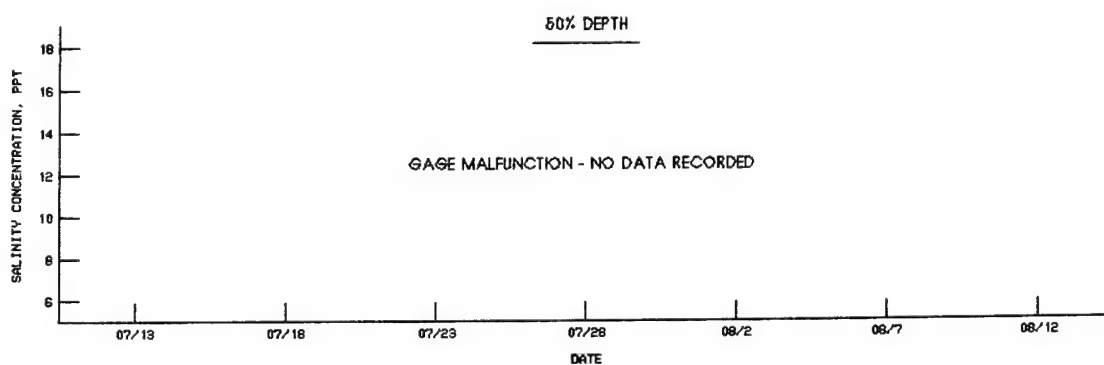
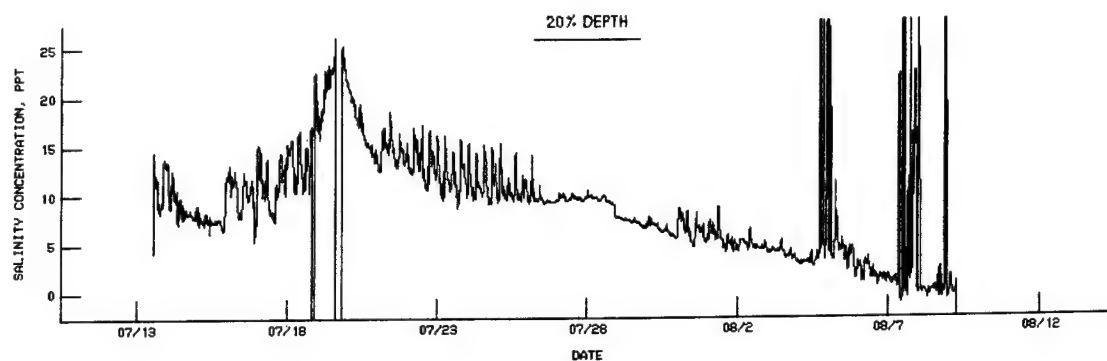
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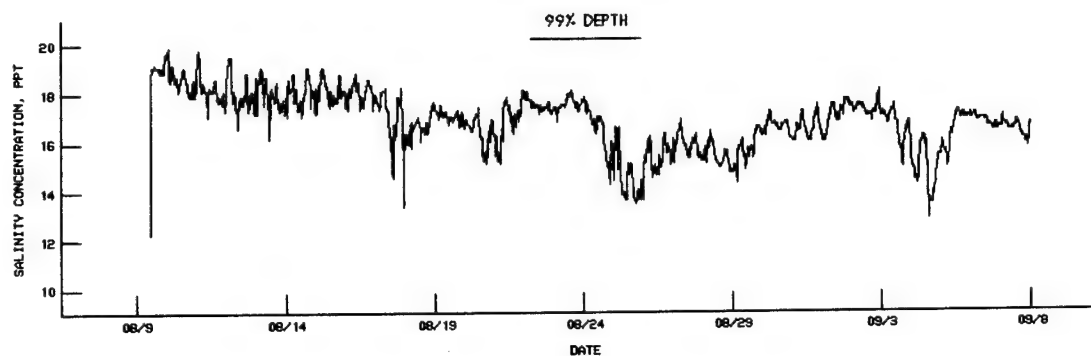
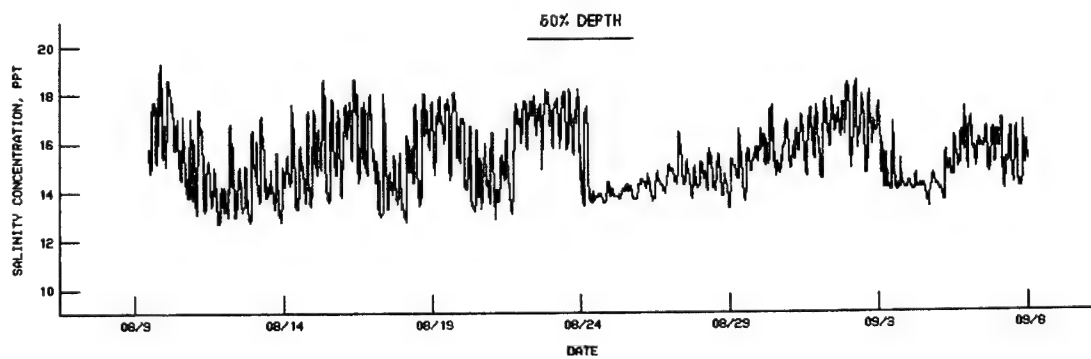
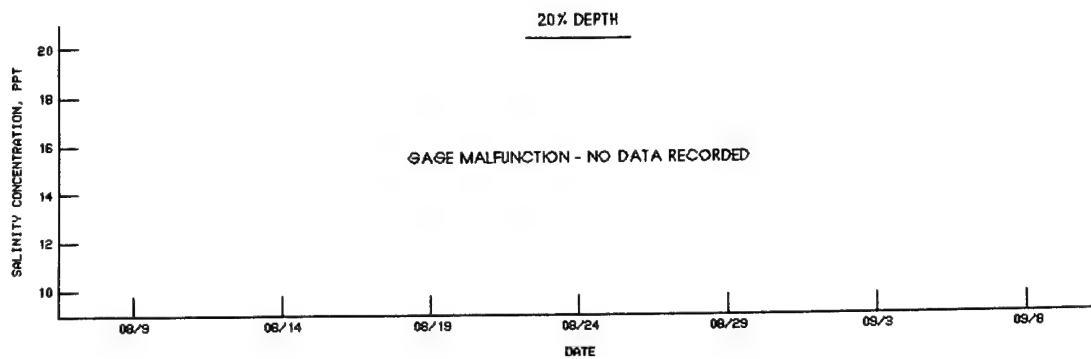
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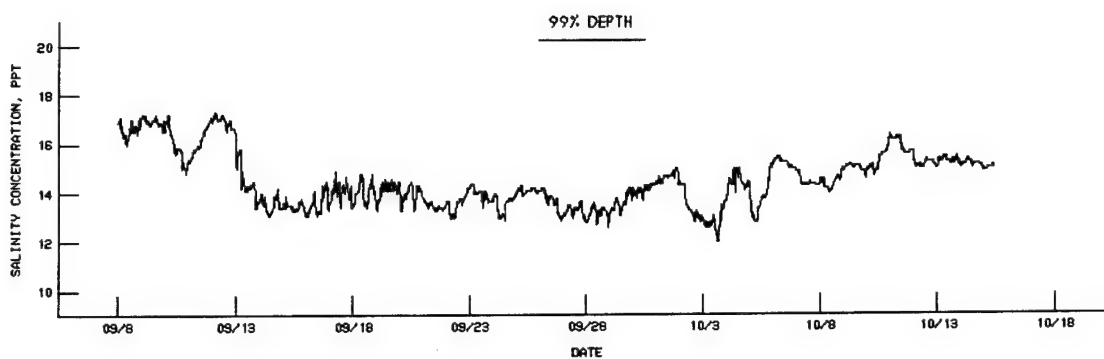
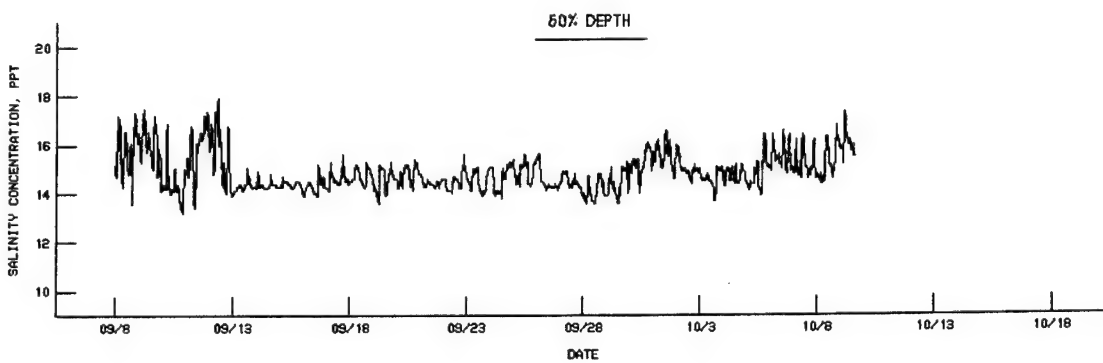
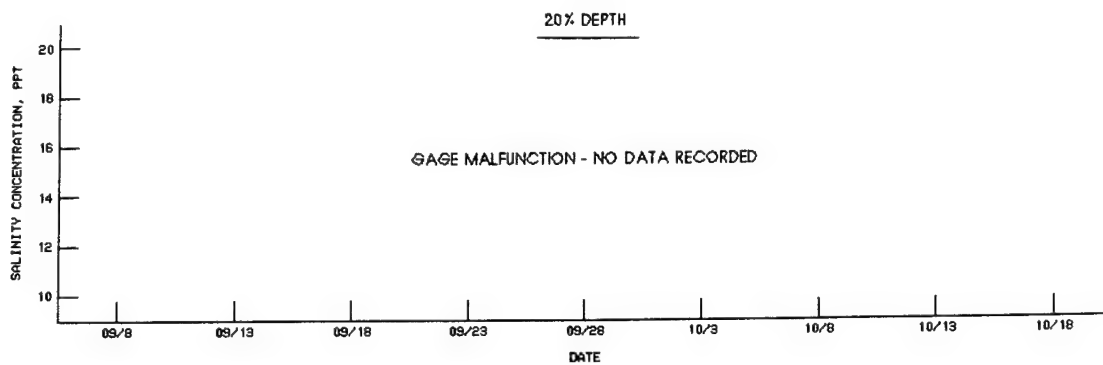
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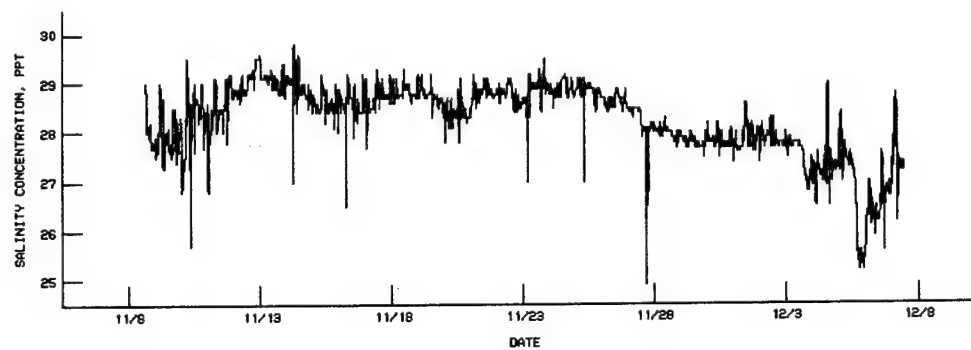
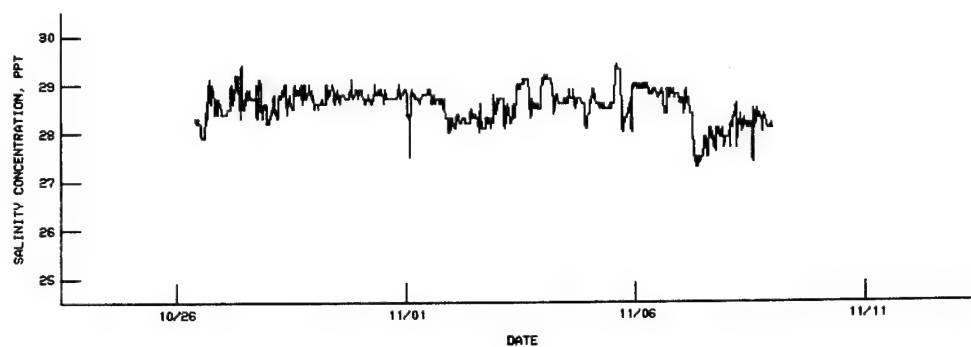
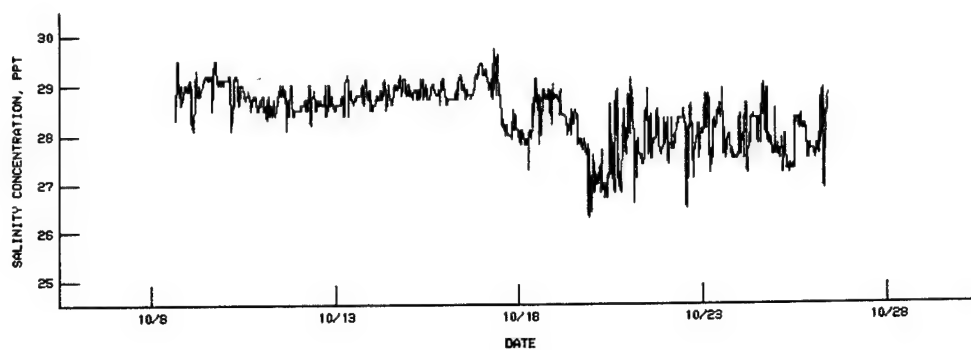
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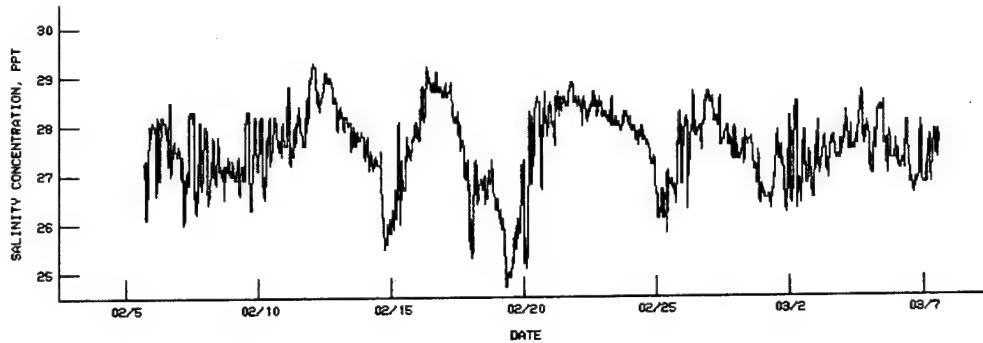
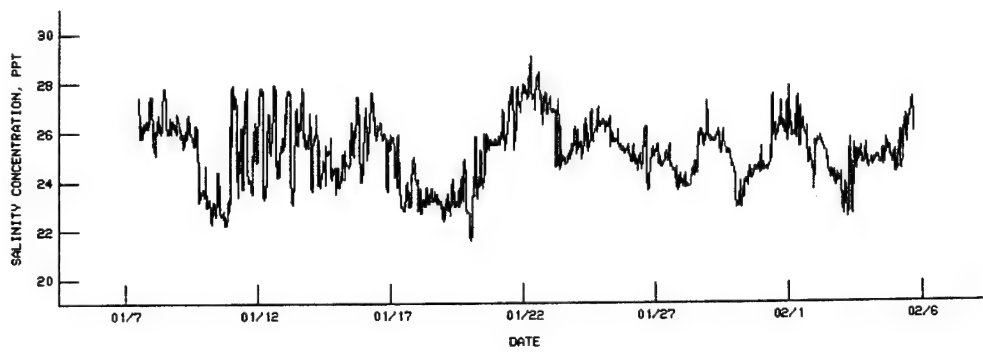
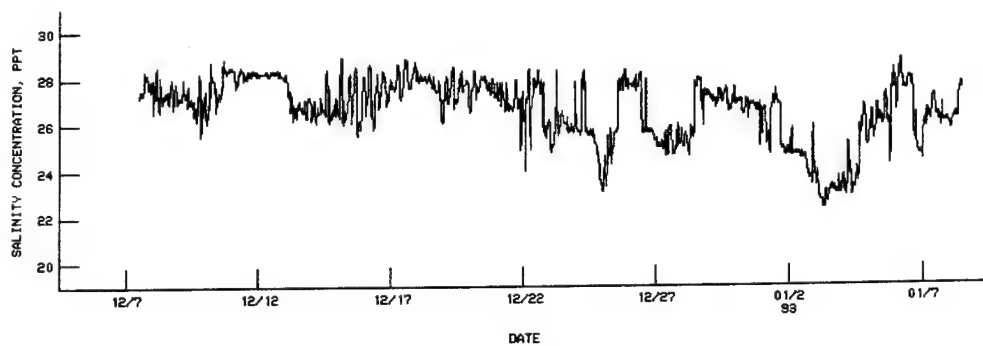
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08/09/93 - 09/08/93



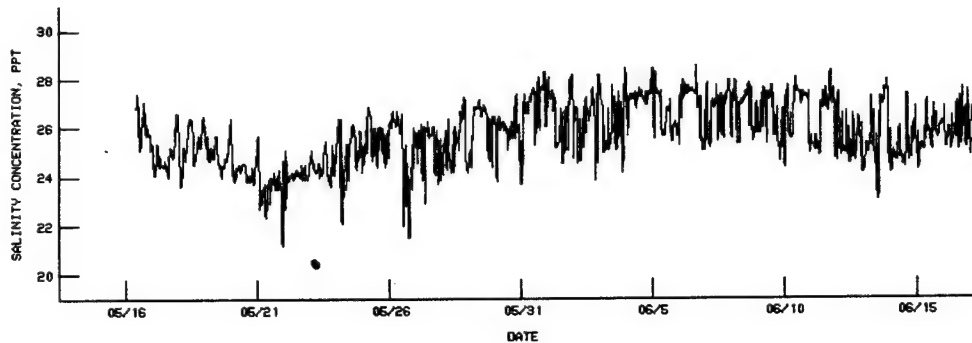
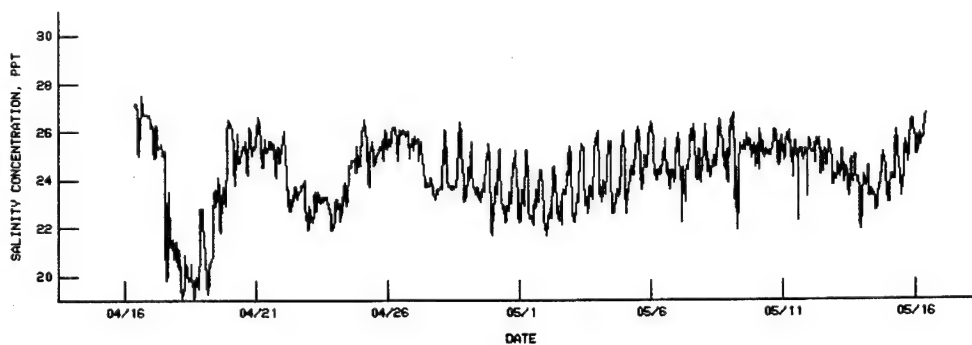
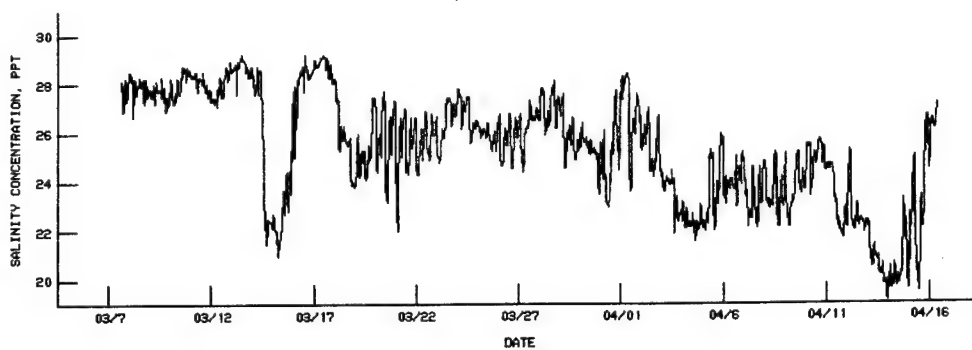
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09/08/93 - 10/15/93



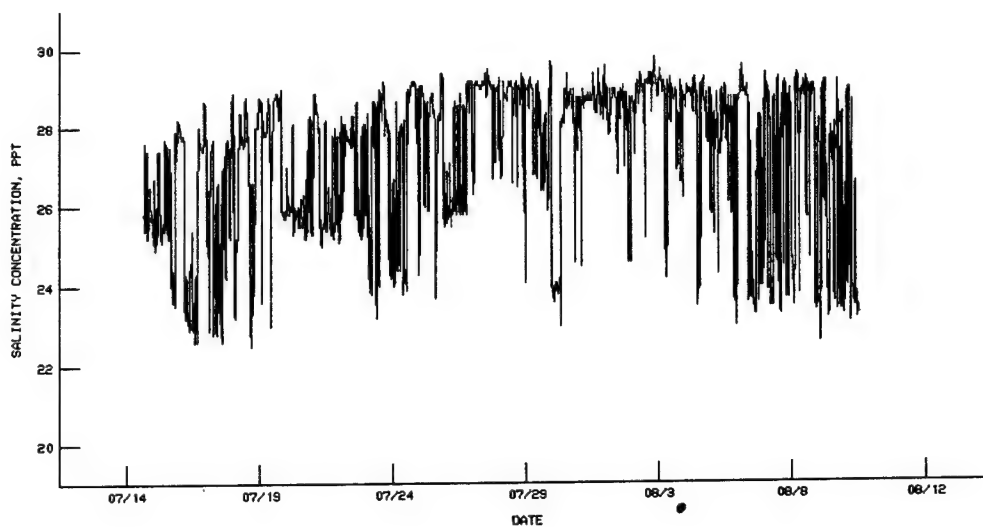
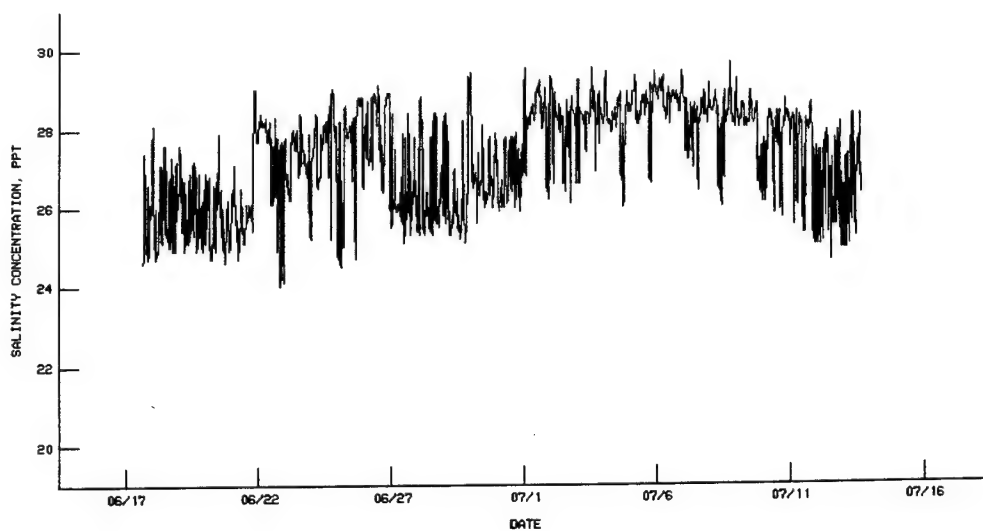
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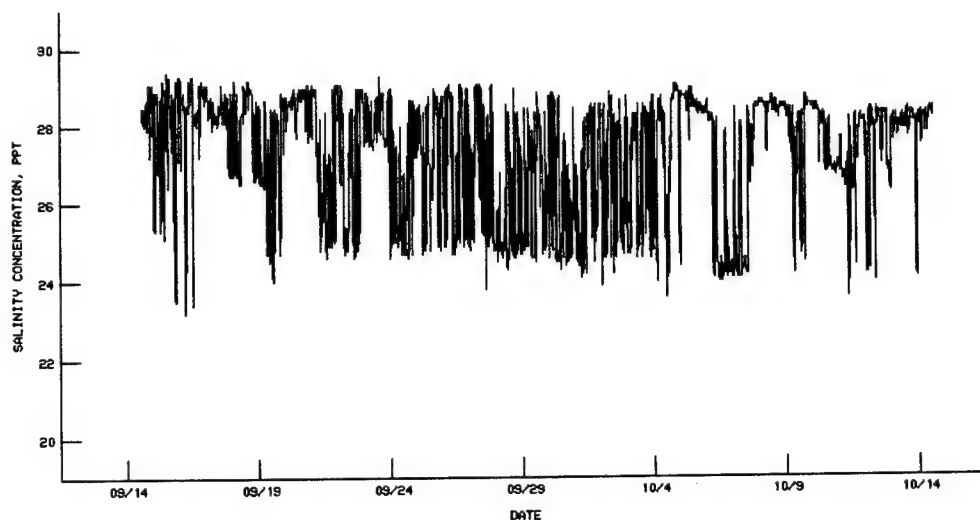
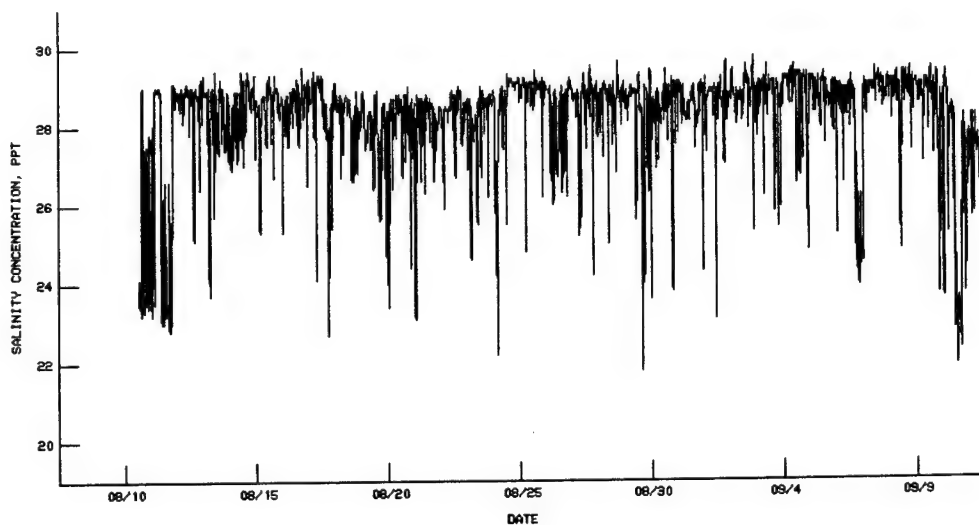
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03/07/92 - 06/17/93**



SALINITY CONCENTRATION
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SALINITY CONCENTRATION
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Appendix A

Estuarine Processes Branch

Data Collection Equipment and

Laboratory Analysis Procedures

Current Velocity and Direction Measurements

The contents of this appendix provide detailed information on the types of data collection and laboratory equipment used in a majority of the field investigations performed by the Estuarine Processes Branch (EPB), Hydraulics Laboratory (HL), U.S. Army Engineer Waterways Experiment Station (USAEWES). The parameters most commonly measured and the types of instruments which can provide these measurements are identified and details discussed in the following paragraphs.

Over-the-side current velocity and direction

Current velocity and direction measurements are obtained by deploying instruments over the side of a boat using a portable equipment setup shown in Figure A1. Collapsible aluminum frames are used to support the equipment, and winches (with 1/8-in.¹ wire rope) are used to raise and lower the velocity and direction equipment. An indicator on the winch displays the depth of the instruments below the water surface. This entire assembly is connected to a streamlined lead weight that holds the sensors in a vertical position and orients them into the direction of the flow. The signal cables from each instrument are raised and lowered with the equipment and connect to the display units located on the deck of the boat. A more detailed display of the system is shown in Figure A2.

¹ A table of factors for converting non-SI units of measurement to SI units is presented on page vi in this report.

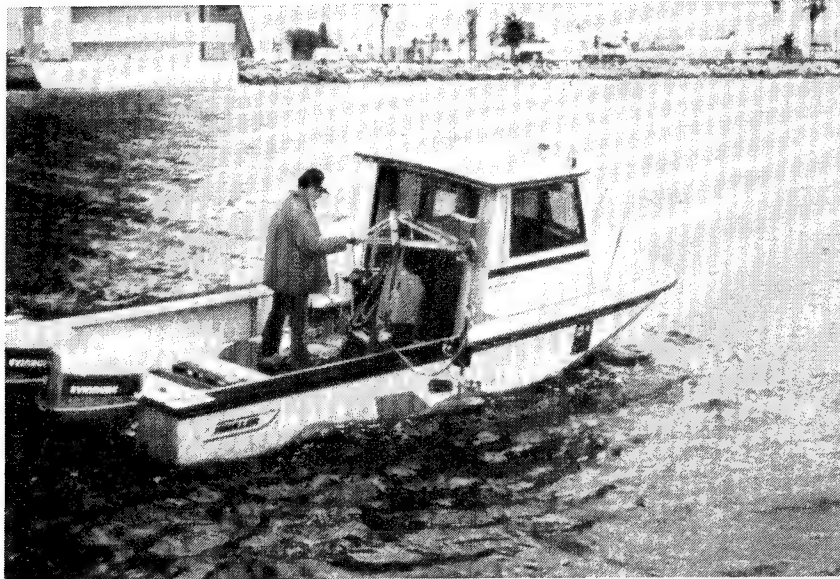


Figure A1. Field deployment of velocity measuring equipment

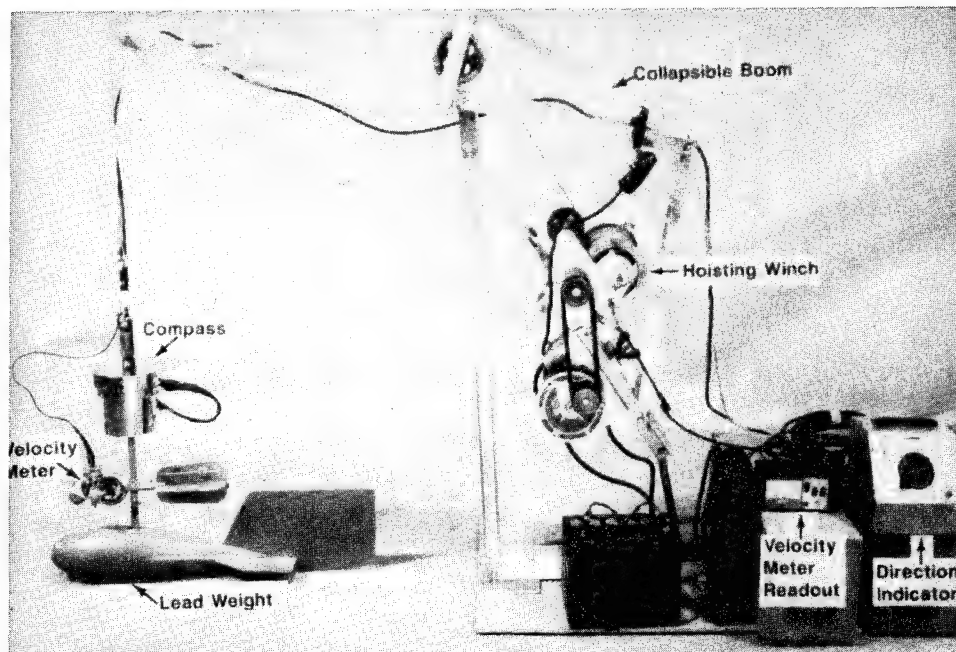


Figure A2. Components of the field instrument assembly

Recording velocity meters

Self-contained recording current meters are used to obtain current velocity and direction measurements for both profiling and for long-term fixed-depth deployment. The type of equipment commonly used is the Environmental Devices Corporation (ENDECO) Type 174 SSM current meter as shown in Figure A3.

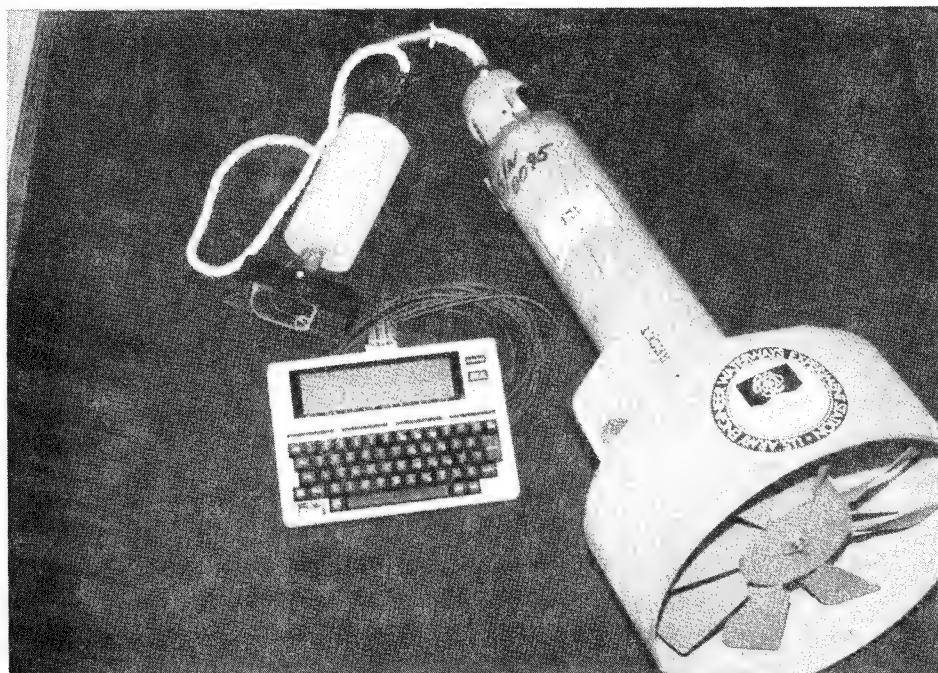


Figure A3. ENDECO 174 SSM recording current meter

The ENDECO 174 SSM meter is tethered to a stationary line, structure, or winch cable and floats in a horizontal position at the end of the tether (as shown in Figure A4). It measures current speed with a ducted impeller and current direction with an internal compass. The ENDECO 174 SSM also measures temperature with a thermilinear thermistor and conductivity with an induction-type probe. Data are recorded on an internal solid state memory datalogger. Data is offloaded from the meter datalogger by means of a communication cable connected between the meter and a computer. The threshold speed is less than 0.08 fps, maximum speed of the unit used is 8.44 fps (10 knots), and stated speed accuracy is ± 3 percent of full scale. The manufacturer states that direction accuracy is ± 7.2 deg above 0.08 fps. Time accuracy is ± 4 sec per day.

Salinity Samples

In combination with the over-the-side velocity measuring equipment, water

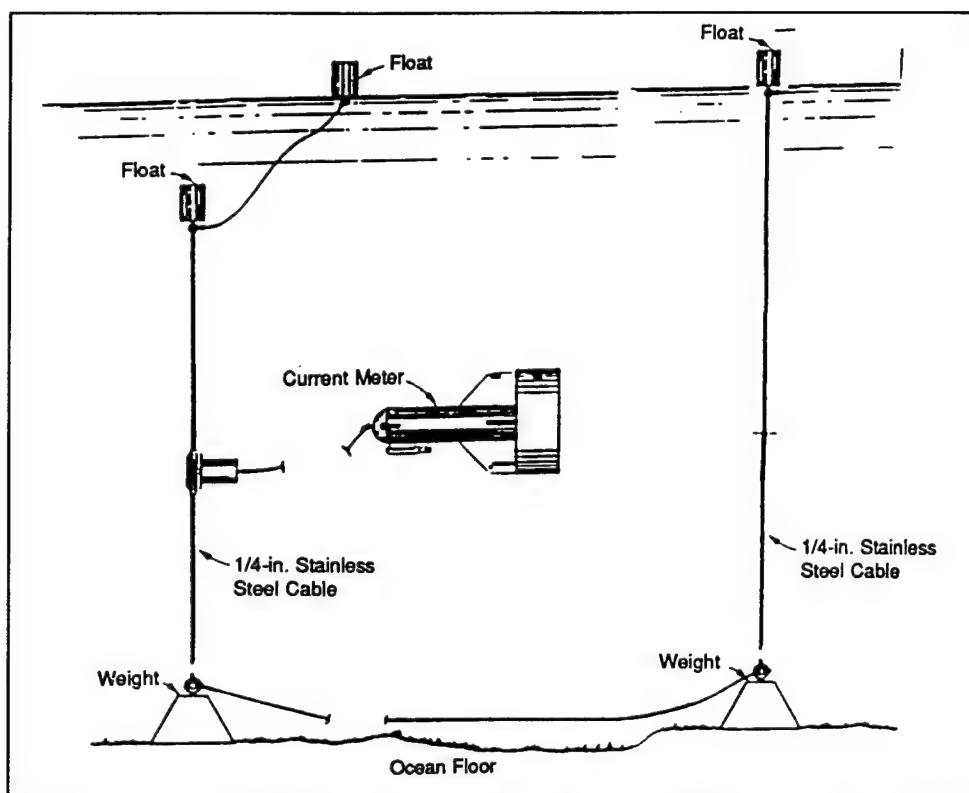


Figure A4. Typical deployment technique for fixed-depth velocity measurements

samples for analyses of salinities are obtained by pumping the sample from the desired depth to the surface collection point. The pumping system consists of a 1/4-in. inside diameter plastic tubing attached to the current meter signal cables for support. The opening of the sampling tubing is attached to the solid suspension bar at the same elevation as the current meter and is pointed into the flow. A 12-V dc pump is used to pump the water through 50 ft of the tubing to the deck of the boat where each sample is then collected in individual 8-oz plastic bottles. The pump and tubing are flushed for approximately 1 min at each depth before collecting the sample.

Water-level Measurements

Water-level elevation measurements can be recorded using solid state electronic recorders, such as ENDECO water-level recorders.

Water-level elevations, temperature, conductivity, and salinity measurements are recorded using Environmental Devices Corporation (ENDECO) models 1152 SSM and 1029 (solid-state measurement) water-level recorders shown in Figure A5. The ENDECO model 1152 SSM and 1029 recorders contain a strain gage-type pressure transducer located in a subsurface case that records the absolute pressure of the column of water above the

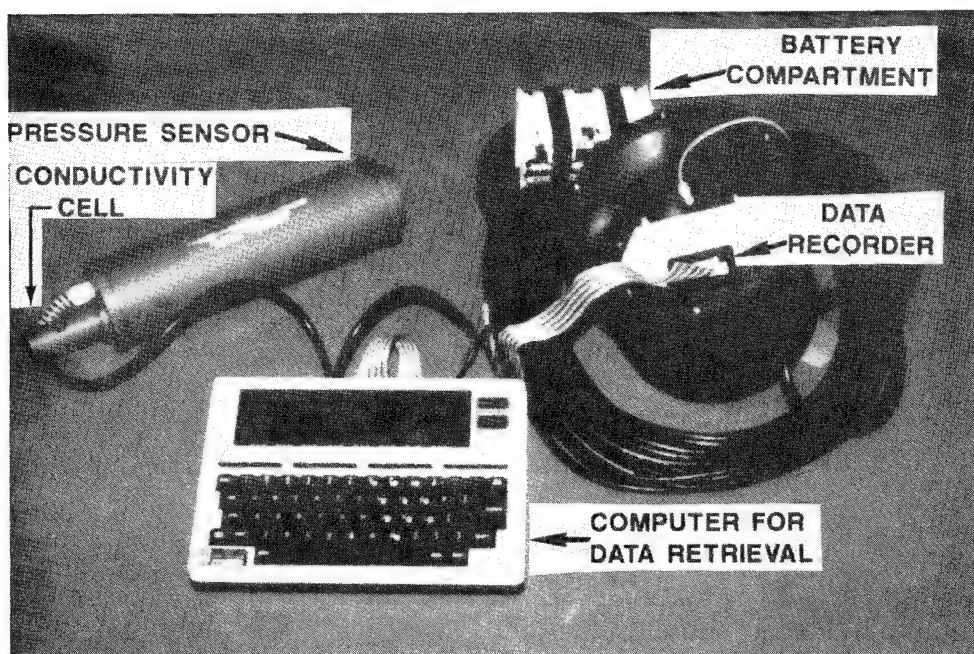


Figure A5. Water level recorder

case. The pressure transducer is vented to the atmosphere by a small tube in the signal cable to compensate for atmospheric pressure. The pressure is measured for 49 sec of each minute of the recording interval with a frequency of 5-55 KHz to filter out surface waves, therefore eliminating the need for a stilling well. The accuracy is ± 0.05 ft. The sampling time interval can be set from 1 min to 1 hr. The 1152 and 1029 recorders also measure temperatures by means of a thermilinear thermistor built into the recorders. The thermistor has a range of -5°C to $+45^{\circ}\text{C}$, with an accuracy of $\pm 0.2^{\circ}\text{C}$. The 1152 recorder measures conductivity by an inductively coupled probe installed on the meter. These measurements and the measurements of temperature are used to calculate water salinity in units of parts per thousand. The water salinities are computed with an accuracy of ± 0.2 ppt.

The sampling time interval for conductivity and temperature cannot be set independently from the water-level measurements. The data from each recorder are stored on a removable EPROM solid-state memory cartridge located in a waterproof surface unit which also contains the dc power supply.

Salinity Measurements

The Hydrolab Datasonde 3 Water Quality Data Logger, shown in Figure A6, provides conductivity and temperature with a computed salinity measurement corrected to a known calibration standard at 25°C . The recorder housing is a high-density PVC case with a specific conductance cell and temperature sensor. The specific conductance probe is a 6-electrode cell having a measurement range of 0.0 to 100 mS/cm with an accuracy of ± 1 mS/cm. The salinity range is from 0.0 to 40 ppt with an accuracy of ± 0.2 ppt (calculated from the conductivity). The temperature probe is a



Figure A6. Hydrolab water quality data logger

thermistor type sensor with a measurement range of -5 to 50 °C with and accuracy of + 15 °C. The data sampling intervals range from 1 to 59 sec, 1 to 59 min, or 1 to 23 hr. Data are stored on nonvolatile EPROM chips. Internal or external batteries provide the power requirements for sensor operation and data storage. Data is offloaded from the instrument via an industry standard RS-232 port to a PC or laptop computer using standard communication software.

Laboratory Equipment and Sample Analysis

An AGE Instruments Incorporated Model 2100 MINISAL salinometer (Figure A7) with automatic temperature compensation is used for the determination of salinity concentrations in the individual samples. The salinometer is a fully automated system, calibrated with standard seawater, and the stated manufacture's accuracy is +0.003 ppt on samples ranging from 2 to 42 ppt.

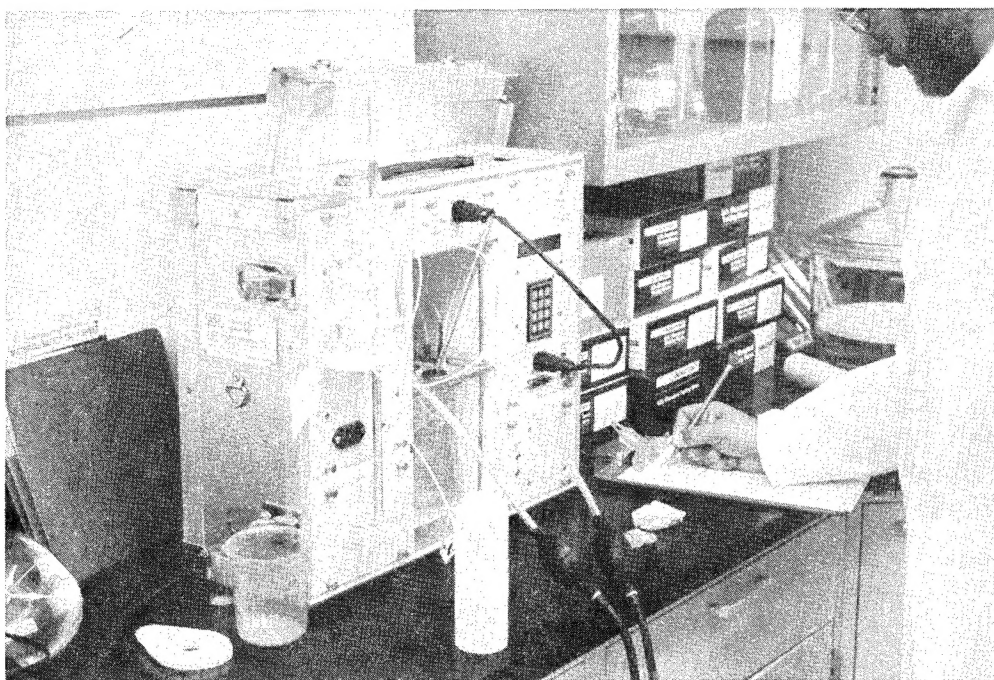


Figure A7. AGE MINISAL salinometer

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| 13.ABSTRACT (Maximum 200 words) <p>A field hydraulic data collection program was conducted in Delaware Bay, Chesapeake and Delaware (C&D) Canal, and Chesapeake Bay from 6 October 1992 through 13 October 1993. During this period three water level recorders, twenty salinity meters, and four fixed-depth current meters were deployed and maintained for the entire study period. The current meters and water level recorders also measured salinity.</p> <p>In October 1992 and again in April 1993, intensive over-the-side measurements were made for a 2-week period from five boats stationed at various locations within Delaware Bay, C&D Canal, and Chesapeake Bay. From each boat, hourly vertical profiles were made at three to five stations. The vertical profiles consisted of current speed, salinity, and water samples at five depths (three depths if the water depth was less than 35 ft). The water samples were analyzed for salinity in the laboratory to verify salinities measured by the current meters. These data are to be used in the verification of numerical models of Delaware Bay. Appendix A presents the data collection equipment and laboratory analysis procedures.</p> | | | | |
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